THE

JOURNAL

OF

INDIAN ART.

VOL. X. Nos. 81-88.

UNIVERSITY OF
MINNESOTA
LIBRARY

ILLUSTRATED

BY

W. GRIGGS, HANOVER STREET, PECKHAM, LONDON, S.E.

OCTOBER, 1904.

UNIVERSITY OF
MINNESOTA
LIBRARY

CONTENTS.

	PAGES
Silk Fabrics of the Bombay Presidency. S. M. Edwards, I.C.S.	1—6
Silk Fabrics of the Central Provinces. F. Dewar, I.C.S.	7—12
Silk Industry in the Punjab. W. M. Hailey, C.S.	13—16
9 full-page illustrations (Nos. 1-9).	
Woollen Fabrics of the Bombay Presidency. B. A. Brendon, I C.S. ...	17—18
Cotton Fabrics of the Bombay Presidency. R. E. Enthoven, I.C.S....	19—20
The Cotton Fabrics of Assam. H. F. Samman, I.C.S.	21—22
Cotton Fabrics of the N.W. Provinces and Oudh. Chas. A. Silberrad, B.A., B.Sc., I.C.S.	23—24
Silk in Burma. J. P. Hardiman, I.C.S.	25—26
15 full-page illustrations (Nos. 10-14, 14*a*, *b*, *c*, 15-21).	

	PAGES
Wazir Khan's Mosque. Fred. H. Andrews.	27—30
6 double and 2 single-page illustrations (Nos. 22-29).	
The Silverwork of Burma. Harry L. Tilly.	31—35
16 full-page illustrations (Nos. 30-45).	
The Jahazi Mahal at Shujabad. Dr. Vogel.	37—41
6 double-page illustrations (Nos. 46-51).	
Wood-Carving in Southern India. Edgar Thurston....	43—50
10 full-page illustrations (Nos. 52-61).	
The Elephant in Industry and Art. Fred. H. Andrews.	51—54
26 full-page illustrations (Nos. 62-87).	
The Elephant in Industry and Art. (contd.) Fred. H. Andrews. ...	55—64
21 full-page illustrations (Nos. 88-108).	

MAR 23 '29 ALLEN

402710

The Journal of Indian Art and Industry.

SILK FABRICS OF THE BOMBAY PRESIDENCY.

By S. M. EDWARDES, Esq., I.C.S., Assistant Collector, Bombay.

"Most writers on silk," remarks the author of an article in the *Textile Journal*, "fix the home of the domesticated worm to be China, whereas a few have adduced arguments to prove an Indian origin for the worm. Among the latter is Mr. Mookerji, who, in an extensive report upon the subject, claims that the ancient literature of the Hindus and the Sanskit language afford valuable historical arguments in support of this thesis." A Sanskrit scholar of Bombay, however, informs us that silk is not mentioned at all in the oldest Vedic works, and that wherever mention is therein made of cloth, cotton and wool form the basis of the fabric. Further, that the word *Chin-ánshuka*, which is once or twice used in later works to denote silken fabrics, points to the fact that China was the original home of both the silkworm and the fabric, which probably were unknown in India until the post-Buddhistic age. Any discussion or attempt to decide the merits of these rival claims must perforce lie beyond the limits of this treatise, which concerns itself rather with the condition of the silk industry in Bombay at the opening of this twentieth century. But one may remark, in passing, that references to silk become gradually more numerous in the post-Christian eras, and that the terms employed by writers of those times to denote silk or fabrics of silk show that they were conversant with the origin of the thread, that is to say, with its birth from the worm.

Interesting though the matter is, one must perforce turn from the historical evidence regarding silk, to the question of sericulture in the present day. In many parts of the world the industry thrives; but to the Bombay Presidency the silk-worm is to-day a complete stranger. In no district is the cultivation of silk from the worm now practised; though attempts in this direction have been made in past years.

In 1827 a small mulberry-garden was opened at Dhulia, under the direction of Mr. Giberne, the Collector of Khándesh; and was visited ten years later by Signor Mutti, who reported that, considering the ignorance of those employed in tending the worms and in looking generally after the garden, the silk produced was good and would fetch about ₹s13 per pound. With this assurance and with the intention of as far as possible aiding Mr. Giberne's work, the Bombay Government indented upon Bengal for five convict families skilled in the management of silk-worms and the winding of silk. The convicts were despatched, but travelled no further than Poona, as the experiments then being conducted in that city augured of greater success. Time passed and witnessed the departure of Mr. Giberne, and the sale of the garden to a native trader, by whom it was allowed to run waste. Others who succeeded Mr. Giberne in the control of the district, had it in mind to re-commence the experiment, but found no opportunity to carry matters to a practical issue.

Signor Mutti commenced the culture of silk-worms in the Kothrud and Dhamdere gardens at Poona in 1829, and was able eight years afterwards to report that his silk had been valued at from 23*s.* to 29*s.* a pound in London, Glasgow, and Manchester. The five convict families aided him, and to such good purpose that others, both European and native, were induced by the sight of his success to set up rival gardens. Thus matters remained until the year 1840, when the guiding-spirit of the enterprise fell ill, and abandoned his duties. Thereafter, doubts as to the permanent success of sericulture in the Deccan began to prevail, and culminated in 1847 in an order from the Government of Bombay to close all operations. The mantle of Signor Mutti fell upon a Major Couss-maker, who from 1875 to 1882 strove, by every device in his power, to reconcile the silk-worm to a domesticated life, and to overcome the natural perils of damp and drought, so fatal to his operations.

Of other attempts at sericulture, that made in Kaira during the early years of the nineteenth century, and another during the seventies at the Dhárwár Jail, deserve brief notice. The Dhárwár experiments, under the guidance of Dr. Mackenzie, met with fair success and continued until 1876. In Kaira, however, the work languished, by reason of the lack of interest shown by the native, and was brought to a sudden close by the excessive heat of the year 1843, which killed all the worms. Sericulture is now non-existent in Bombay, which is thus forced to depend upon China and Bengal for a supply of silk.

The Raw Silk.—Since, then, raw silk is produced in no part of this Presidency, whence does it come, and in what condition does it reach the hands of the weaver? Excluding the case of the Silk Mills, which will be noticed hereafter, there appear to be four places from which the raw material is distributed, usually *viâ* Bombay, to the various centres of the hand-weaving industry. They are China, Bengal, Persia, and Bangalore. But the variety, and the condition in which it is imported into up-country towns, differs according to locality.

Of the real China silk, the following five varieties find their way into the Bombay market:—Superior China, costing Rs.20 per lb; Lankin, Rs.18; Kayyam, Rs.16; Mayya, Rs.14; Panjam (very inferior), Rs.8 or Rs.12. All these kinds are imported in the raw thread state direct from China by the Chinese and Khoja merchants of the city, and are unbleached and undyed. A very small quantity, ready bleached, is also annually brought to Bombay. Such of it as remains in Bombay is sold to Multanis and Bohoras residing in Thossa Moholla and Bhoiváda, and by them to the local loom-owners, who favour the best quality for the warp and other qualities for the woof. The rest, which finds its way to out-stations, is occasionally bleached and dyed in Bombay, but more often travels in the condition in which it arrived. Coming to the Central Division of the Presidency, it appears that Yeola obtains Chinese silk of various qualities from Bombay, commencing with the very best quality at ₹s 20 or more per lb., and passing on through many kinds known as Charám, Sot, Salbaphi, and Sim, which cost from Rs.8 to Rs.16 per lb., to the inferior Panjam priced at Rs.2½ per ser. A small quantity of dyed silk thread also is imported into the town of Násik. The import into Poona consists of hanks of three varieties, of which

"Lankin" thread is the most noteworthy, and which, after arrival from Bombay, have to be locally prepared for the loom. Three places only in the Northern Division import Chinese silk, namely, Thána, Surat, and Ahmedabad. Of these, Thána uses but a small quantity, though of the superior kinds. But Surat and Ahmedabad order very large quantities of every variety of silk thread from the merchants of Bombay. A few well-to-do persons obtain the material direct from China, and have no dealings with the trading community of Bombay. The silk is imported in hanks, which are subjected on arrival to the ordinary spinning and reeling, and is known by a variety of names, denoting its several qualities. Both places are also reported to import the material bleached, spun, and dyed. Regarding Sind, most of the silk used in Hyderabad, Tatta, and other places, comes from Bombay, is of superior quality, and is locally reeled, spun, and dyed. Hyderabad, however, claims to occasionally obtain ready bleached and spun Chinese silk.

The raw material of Bengal holds the second place, in respect of the quantity used in this Presidency. Usually it reaches the local trader by rail from Calcutta, passing *en route* through Bombay. Like the silk of China, it consists of more than one variety, according to the class of worm from which it springs. Bengal silk is invariably of a deep yellow hue, and hence is known throughout the Southern Division of the Presidency as *Bhangar gundu, i.e.* "golden ball." Like the white silk from China, it arrives in hanks of thread, roughly spun, but not sufficiently strong to admit of its being used at once in the loom. The Bijápur district is supplied with this class of silk by the trader of Bágalkot, who, after import, either has it locally bleached and thrown, or distributes it in its unfinished state to the small traders of the villages. It is similarly imported in considerable quantities *viâ* Bombay into Belgaum and Dhárwár. The former of these two districts also imports raw hanks direct from Murshidabad, and performs the bleaching and dyeing processes within its own limits; inasmuch as the procedure formerly followed of buying it dyed from Poona and Bombay was found to be unduly expensive. In the Central Division, Sholápur and Sátára obtain it from Calcutta and other places in the North-West Provinces, and prefer it, by the reason of its cheapness, to the silk of Hongkong; while Násik, Poona, and Ahmednagar are also partial to its use, importing it partly direct from Calcutta and partly through merchants in Bombay. Sind has it brought direct from Bombay, as a general rule; though, in the case of Tatta, a certain quantity is delivered by a more direct route from Mooltan.

Silk, denoted by the name "Laddu" and imported from Bangalore, is used only by the weavers of the Southern Division of the Presidency. Being of inferior quality, the amount imported is, even in Belgaum and Dhárwár, not large; while more remote centres of the industry could hardly be expected to go to the expense of importing it from the Southern Presidency. The only places which consume Persia silk appear to be Poona and Násik; they receive it in small quantities from Bombay, whither it is brought from Muscat, Its quality should be superior, as it is the product of the "Bombyx Mori," and is said to be capable of being easily reeled. A good deal of the silk used in Sind is said to come from Bokhara and Kabul; and local report mentions a curious method of hatching the eggs of the silk-worm moth in Afghanistan, by tying them up for five or six days in the hollow of the arm-pit. As soon as the worm appears, it is transferred to mulberry trees, which are covered with thin gauze or muslin cloths to prevent its crawling away.

Sorting, Reeling, and Spinning.—The raw silk, as was mentioned above, arrives in hanks of thread, which is not sufficiently strong to bear the tension of the loom. The fundamental object, therefore, of the first process in the preparation of silk is the strengthening of the thread for the warp. The woof-threads, as a rule, undergo a less intricate process of preparation. In Surat it consists merely of winding the threads from two or more bamboo frames, according to the thickness required, on to a "parta" or reel, and thence on to small bobbins. The silk used in the woof is coarse and of the quality from which tassels and strings are made. In the preparation of silk for the warp, the following five instruments or appliances are used:—(1) A large cage made of string and bamboo; (2) a conical reel of split bamboo; (3) reed bobbins; (4) one small wheel or "roda"; (5) the throwing-machine or "rahat," which includes a large wheel called "charka," a bobbin-frame, two sets of glass bangles, and a long drum or roller of wood. The bamboo cage is first called into play. The sorter opens the hank of raw thread and places it round the cords of the cage, and then fixes the cage in such a way that it will, when impelled by the toes, revolve with its axis vertical. The sorter, who may be either a man or a woman, then sits down with five or six of the conical reels at his side. As the quality of the fibres in one hank are numerous, the sorter's chief duty is to watch the gradations of the thread, as it leaves the cage, and wind all silk of each variety round a separate reel. He next finds the end of the raw hank, knots it to the spoke of one of the reels, and with his foot starts to turn the bamboo cage; at the same time he with one hand twists the reel. The fibre passes off the cage, through the fingers of his other hand, and on to the reel. As soon as he feels the quality of the silk change, he breaks the thread, picks up a second reel, knots the end of the thread to it, and again winds on, until the quality changes a second time, when a third reel or the first again, as the case may be, is taken up. If the new quality is similar to that on the first reel, the two ends of silk are put into the mouth and tied by the tongue in an extremely neat and speedy manner. The reason why this operation is performed by the tongue, and not by the fingers, is that the silk is liable to cut the skin of the fingers, whereas the moisture of the tongue softens and prevents it from causing an incision. In this way, even a youthful worker will, without hitch or mistake, sort the hank over five reels. The silk is now ready for spinning; and the small wheel and bobbins are called into play. The wheel is supported on either side of the axle by uprights, fixed in a flat wooden stand, at the other end of which are two smaller uprights, supporting a steel spindle, which projects a few inches at the side. A cord passes round the wheel and spindle. The spinner first places one of the hollow reed bobbins upon the projecting part of the spindle, and ties to it the end of the silk which is upon the reel. Then, holding the reel in one hand, he turns the wheel with the other. The silk thread, which has already been connected with the bobbin, slowly winds off the reel and on to the bobbin. This process is continued until all the bobbins required have been loaded with thread.

The last process is the most intricate of all, and consists in transferring the thread from the bobbins on to the circular drum. The machine used is in three parts; firstly, a large wheel turned by hand, secondly the bobbin

frame, and thirdly the drum. The bobbin frame consists of an upright central bar or bars and two upright side pieces. The central bar is furnished on either side with a row of iron or wooden spindles, on to which the reed bobbins slide; and each of the side bars has a row of glass bangles, in number corresponding to the number of spindles. Each bangle is fixed directly opposite to its respective spindle. To impart a circular motion to the spindles, they are each connected by a cord with the big wheel, the cord in each case passing round the wheel and the inner end of the spindle. The whole frame is about five feet high, and rests during the process in a slanting position; the bottom part being on the ground, and the top part supported by upright posts fixed in the ground in front of the wheel. In front of the bobbin frame with its spindles and bangles are two upright posts, between which is supported a round roller or drum, about 6 or 8 feet long and 2 feet in diameter. It is made to revolve by a strap or cord passing over its centre and round the axle of the big wheel. Halfway down the posts, and likewise fixed horizontally between them, is a rod set with a number of glass bangles. It should be specially noted that the number of bangles upon this rod are exactly half the aggregate number of bangles fixed upon both sides of the bobbin frame. In other words, if each side of the frame contains 16 bangles, and the whole frame 32 bangles in all and 32 bobbins, then the bangles upon the horizontal rod number 16. To explain the process more clearly, we will concern ourselves with two spindles only—that is to say, with the top spindles upon either side of the central bar of the frame. On to each of these the workman places a bobbin; these two bobbins contain thread of similar quality. The thread from each is passed through its respective bangle, the two threads remaining separate until they reach the horizontal rod. There they are united, and pass together through one bangle in the series upon the rod. The twofold single thread then passes upwards on to the drum, to which it is secured. The bangles upon the rod are so placed that a twist is given to the threads as they pass through, and causes them to unite more closely into one double thread. Thus, when the workman starts the big wheel moving, the cords which pass round it put each set of two spindles in motion; each pair of bobbins revolve and send their threads separately through two bangles upon the frame; each pair of threads pass onward to the horizontal rod, where the divided pair become one, and are slowly rolled round the drum. In other words, supposing there are 16 bangles on either side of the frame, one sees 32 threads pass upward to the horizontal bar. These two threads are twisted into one, and 16 twofold threads pass upwards to the drum. At the end of the process, therefore, there are upon the drum 16 separate rolls of silk, at equal distances from one another, and the thread of which each roll consists is "dontar," or double thread. A slightly different process, productive of the same results, is followed in Surat.

Bleaching and Dyeing.—The silk, now reeled and spun, is well-nigh ready for the dye-vat. But, that each step in the gradual evolution of the raw material may receive notice, it is desirable to subdivide the next process into four distinct stages, namely Bleaching, Mordanting, Dyeing, and Sizing.

Bleaching.—To whiten the silk and clear it of impurities, it is immersed in a solution known as "Ukhar"; of impure carbonate of soda, or of this material and slaked lime. Impure carbonate of soda is of three kinds, known as *papadkhar*, *kelikhar*, and *kháriméti*; the first-named, however, is the most commonly used. Assuming the weight of silk to approximate to 80 tolas, a solution of 20 tolas of *papadkhar* and 30 lbs. of water is made, some 15 or 20 tolas of native soap or soda being sometimes added thereto. The whole solution is set to boil in a large vat. As soon as the first effervescence appears, two men dip the silk (which is still damp from immersion in cold water) into the boiling solution. The dipping is effected by means of two wooden sticks, about the size of a pestle, upon which the skein or hank is suspended. The workers, one of whom stands on either side of the vat, grasp the ends of the sticks and lower the silk four times into the bleaching mixture. Then, moving the sticks round to the immersed portion of the skein, they likewise dip the remaining portion four times. The whole circumference of the skein is in this way subjected to immersion, and the silk is rid of all dirt and gum. When drawn tight upon the sticks, it emits a grating sound, from which an experienced bleacher can always decide whether the silk has been sufficiently soaked. Once fully bleached, the silk is cooled by immersion in cold water and finally dried, partly by wringing it in the hands, partly by striking it against a flat slab of stone.

Such being the process in regard to silk that has to pass through the hands of the dyer, it only remains to note the procedure in the case of silk which is to be used white or undyed. The boiling solution of *papadkhar* is generally employed; but, occasionally, a simple washing with country soap is considered sufficient. Country soap is manufactured from the oil of the Bassia latifolia, boiled in an alkaline lye of khar and lime, and costs about 1⅓ annas per lb. After washing, the white silk is subjected to fumigation. A large bamboo basket is turned upside down, and underneath is placed a vessel containing burning sulphur. Upon the upturned bottom of the basket the silk is spread out and covered with cloths. The sides of the basket are likewise covered to prevent the entrance of air and the escape of the fumes. In this condition the silk remains for some fifteen minutes and is then ready for use in the loom.

Mordanting.—This is the second stage through which silk has to pass before being dyed, but is never followed if the silk is to remain white. The process, as followed in the Southern Division of the Presidency, is thus described. Some three to five tolas of alum are dissolved by gentle heat in 15 lbs. of water. The bleached thread is steeped in this solution for one night, and then washed four or five times in clear water. The length of time during which the silk is steeped, as also the quantity of water employed, vary from place to place. It may be here noted that in the case of silk dyed to certain shades of yellow, this alum solution is often mixed with the dye; and that in Poona, whenever aniline dyes are used, the silk, after immersion in the alum bath, is subjected to further immersion in a solution of turmeric.

Dyeing.—The indigenous dye of India has been gradually displaced by the aniline or alizarine dye of Europe, and a change has thus come over the spirit of the industry. For some colours (notably red, pink and yellow) the country dye is still in request; but here, too, the European dye is like in time to prove victorious by reason of its cheapness, and of the fact that less labour and time are necessary for its manipulation. Whether the change is wholly worthy of approval, seems open to doubt. Cheap and handy though the aniline dye may be, it

is oftentimes in danger of lending to the fabric a somewhat common character. Moreover, it possesses no durability. The silks of old time were simple, but they were good; neither sun nor rain could dull their colouring, yet they are yielding place to fabrics, the hues of which, though more brilliant, are ephemeral. The nature of the Indian craftsman has doubtless contributed to the change. Ignorant of the science of his industry and powerless thereby to initiate any new departure in his art, he is yet ready to associate himself with any method that may ensure less expense and less personal labour. He has not the ingenuity to enlarge or improve upon the art of his forefathers. Europe spreads before him the fruits of her restless research, and he can but accept and imitate.

Red.—Cochineal is universally used to dye silk red. With it are pounded pistachio nut galls, in the proportion of $\frac{1}{4}$ to $\frac{3}{4}$ of pistachio nuts to 1 of cochineal. Occasionally a certain quantity of sodium bicarbonate and turmeric is added, the soda being supposed to aid the entrance of the dye into the inmost fibre of the silk. All these ingredients are boiled together in water, and as soon as the mixture reaches boiling point, the silk is dipped therein. It is allowed to remain in the solution for one night, cooling gradually, and is then removed, washed in cold water, and dried. The dyers of Belgaum always dye the silk in shade, as the action of the sun causes the dye to fade. Turmeric is added to the solution to lighten the shade of the dye, while immersion in lime-juice and water is also in favour, if a brighter colour be required. Aniline magenta is also added to increase the lustre of the dye.

Yellow.—To obtain this colour, a solution is usually made of *papadkhar* (impure carbonate of soda) and Kapila powder, the reddish-yellow powder which covers the fruit of the Kamila tree (Rottleria tinctoria). In most places alum and oil are also added to the solution, the amount of alum used depending upon the depth of colour required. In Yeola a reddish-yellow is obtained by mixing the Kapila powder and alum in the proportion of 14 to 3. In Gokák aniline yellow is often used in place of the soda and oil.

Green.—Usually yellow silk is dipped in an indigo-bath, or, as in Gokák, silk already dyed with indigo is subjected to immersion in a solution of turmeric. In Sind silk is dyed green by immersion in successive solutions of pomegranate rind, indigo, turmeric, and alum; while in Dhárwár the aniline dye is used in direct conjunction with Kapila powder.

Purple.—A common method of obtaining this colour is to use black silk for the warp and red silk for the weft. If actual dyeing is resorted to, aniline dyes are used. A more laborious process is to steep red silk in an infusion of myrobalans, and thereafter dye it with indigo or with sulphate of iron.

Black.—To secure this colour, the silk is first steeped in an infusion of myrobalans, and for one night in sulphate of iron, is then squeezed, steeped in cocoanut oil or milk, next boiled once again in a solution of sulphate of iron, and when cool, washed in cold water. The silks of Tatta in Sind are boiled in pomegranate peel, myrobalan water, and iron filings. A similar solution is used in Hyderabad, but with a further admixture of flour and sand, which is said to foster the corruption of the silk. In Ahmedabad a purplish black is obtained by steeping red silk in a strong indigo bath.

Blue.—The use of aniline dye is almost universal, and has largely superseded the dyeing of silk with indigo.

Reddish-brown or Snuff-colour.—This colour is said to be obtained in Násik by steeping the silk in a decoction of Acacia arabica (*bábul*), Arabica catechu (*khair*), and catechu powder.

The cost of bleaching and dyeing a fixed quantity of silk varies slightly in different districts. In Gokák, for example, Rs. 1 - 9 is declared to be the cost of dyeing 71 tolas of silk red, while in Belgaum it approximates to Re. 1. In general, the cost of the process may be estimated roughly at Re. 1 per seer of silk.

Sizing.—Having concluded the dyeing operations, the dyer returns the silk to the weaver, considerably reduced in weight. The case of silk dyed black is the one notable exception to the general rule. In order, therefore, to restore as far as possible the original weight, and also to render the thread more suitable for weaving operations, the silk is sized. Arrowroot paste, sugar, gum, and honey, are all made use of in this regard; while the weighting of the thread, in Bijápur, is also accomplished by the use of linseed oil. The process as followed in Násik and Yeola is thus described in the *Bombay Gazetteer*. The thread is first placed upon the "tansála," consisting of a pair of upright wooden bars, about 8 feet high, furnished with a row of glass rings, through which the yarn is passed and drawn tight. It is then stiffened by being brushed over with a dressing of size. This process applies to the warp silk. The weft silk, on the other hand, is subjected to a somewhat longer preparation. It is first placed upon the "phalka," or reeling-cage, and thence wound on to the "asari," or reel. While on the reel, it is moistened with size. The sizer, who is usually a girl, then sits down with the reel on her left hand, and on her right a small wheel, to the axle of which is fitted a piece of reed called "likhádi." Picking out the end of the skein from the reel, she fixes it to the reed and then starts the wheel revolving. As the thread winds off the reel and round the reed, she wets the skein upon the reel with size, and holds the winding thread between her fingers, so that the size is evenly spread over the surface of the fibre.

Warping and Weaving.—The dyeing and sizing operations concluded, the silk is tied into a rough skein and returned to the weaver, who has to wind it on to the reel. Usually this is effected in the ordinary way by means of the bamboo-cage; but in the Southern Division the hank is placed instead upon three smooth sticks standing vertically upon a horizontal wooden base, or, at times when wood is not procurable, fixed in a lump of clay. This process consists in the weaver taking the end of the thread, passing it through a bangle above his head, and thence winding it by hand upon a reel. The thread is then handed over to the warper (in many cases a woman), who stretches it upon the warping-frame.

The warping-frame consists of two upright boards or posts, in which are fixed a series of pegs, one below another. The left-hand post, as one looks towards the frame, contains 13 pegs, the right-hand post 12. About an inch from the end of each peg, a small cross-stick, usually a slip of bamboo, protrudes on either side of the peg. The whole frame is about 6 feet high by 8 feet long, while the pegs which protrude at right angles to the sides are some 6 inches in length. In front of this frame sits the warper upon a stool. On her left-hand side is placed a reel, with its hank of sized and dyed silk; its axis rests upon the ground and is prevented from slipping

by a piece of wood or stone; the cage of the reel is slightly elevated by a support, usually a block of wood or stone, so that the silk can wind off the end without impediment. In her right hand the warper holds a piece of hollow bamboo in the form of a crutch. She first picks out the end of the hank and threads it through the upper arm of the crutch, and fastens it to the top peg on the left-hand post. She then fixes a thin piece of bamboo aslant across the left-hand corner of the frames and below the top left-hand peg: the object of this is to push the back row of threads out of the straight line, running between the two pegs, so that the whole warp will be sufficiently slack, after the slip is removed, to come easily off the pegs. Now it must be borne in mind that the whole object of warping is to make what are known technically as "leases"; that is to say, to arrange the threads in such a way that they will cross one another and remain crossed when taken off the frame and stretched upon the loom. The end of the thread, as mentioned above, is fastened round the top peg of the 13 upon the left-hand side: the warper moves the crutch, through which the thread is passed, towards the top peg of the 12 upon the right-hand post; as she does so, the silk unwinds from the reel. The crutch guides the thread round the outside of the bamboo slip in the left-hand corner, across to the right-hand corner, round the inside of the upper part of the cross-pin, which projects from the peg, round the body of the peg, round the outside of the lower part of the cross-pin, and finally carries it right across the frame to the original top-peg of the left-hand 13, from which it started. Here the thread passes round the inside of the upper arm of the cross-pin, round the body of the peg, then round the outside of the lower part of the cross-pin, and lastly straight across the frame to the second peg of the 12 upon the right-hand side. Here the same process is repeated, and the thread journeys across the frame once more to the second peg of the 13 upon the left-hand post. Thus it is carried backwards and forwards across the frame until it is finally brought to an end at the bottom peg of the 13 upon the left-hand side.

Having reached the bottom peg of the 13 on the left side, the warper makes no pause, but follows precisely the same course backwards, making an upward journey until she again reaches the top peg of the left-hand 13. The whole distance travelled by the thread from peg 1 and backwards and forwards across the frame to peg 13 is fifty-two yards, the ordinary length of the warp. The whole time that the thread is passing off the reel and being guided on to the pegs, it passes through the left-hand fingers of the warper, who in this way modulates the strain put upon the silk by the movement of the crutch in her right hand, and discovers any roughness or lumps in the thread.

The next process consists of heddle-filling, joining, and arranging. If the new warp-threads have to be placed in position and drawn one by one through the eyelets of the heddles and the teeth of the "phani" or comb, a professional heddle-filler has to be called in. But ordinarily there are still lying between the teeth of the comb and the eyelets of the heddles the threads left from an old warp. These are utilised in the following manner. The warper takes down the new warp from the pegs, with its leases still protected by the knots of string, and draws it out lengthwise, so as to form one long stretch of threads, each crossing the other at intervals, throughout the length and breadth of the warp. He then cuts through one end of the warp, and unites the ends of the divided threads, one by one, with the ends of the old warp, which protrude through the heddles and the teeth of the comb. This process of joining new ends to old consists merely in twisting the two ends between the fingers and applying thereto a little gum. The worker next draws the threads of the old warp through and out of the eyelets of the heddles and the teeth of the comb; and they in their turn draw the threads of the new warp, to which they are severally united, into their proper positions between comb-teeth and heddles. The ends of the new warp are then fastened round the square cloth-beam (directly in front of the weaver's seat), round which the fabric is rolled during the process of weaving.

One end of the warp is therefore secured round the cloth-beam; and it only remains to fasten the other end to its respective beam, known as the warping-beam. This end of the warp is left uncut, and sections of it are taken and fastened to the beam, the rest being rolled up into a bundle and suspended over the beam, which, as the process of weaving goes on, moves gradually forward towards the heddles and comb. When it has drawn near enough, a further section of warp thread is loosened from the bundle overhead, and is attached in sections, as before, to the beam, which, relieved of all strain, can be moved back to its original position, about six feet away from the weaver's end of the loom.

The whole warp now lies stretched upon the loom, and merely requires a little arrangement before the weaver commences his labours. The process consists in moving the comb and heddles into their respective positions, taking care that the threads run through them properly, and in untying the knots round the leases. When these knots are untied, each lease is moved by hand into a straight line with its neighbour; and in order that the upper and lower threads of the lease may not get entangled, flat strips of bamboo are placed horizontally between them. The strips are two in number, and lie close together on either side of the point at which the upper and lower threads of the warp cross one another.

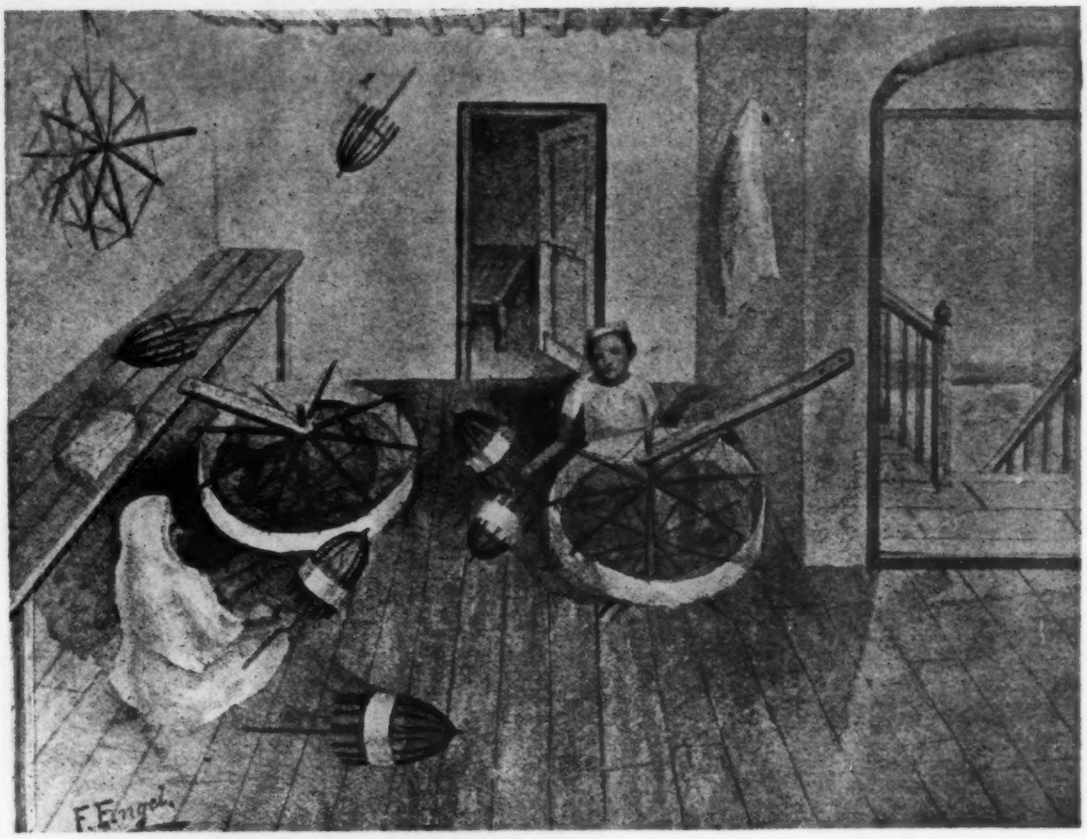
The last process, that of weaving, has now been reached. Before entering into details, it will not be out of place to give a brief description of the loom. Commencing from the weaver's end, the first object of interest is the weaver's pit, some 30 inches long by 15 or 20 inches deep, in which the weaver sits when at work. In front of the weaver is the cloth beam, a solid square bar 4 feet long by 2 to 4 inches broad. The ends of the beam rest in sockets, which enables the weaver, as the work progresses, to slowly turn the beam and roll the web round it. The beam is raised some 2 inches from the floor, and is kept in its place by two strong pegs. Behind the beam, and supported from the roof by cords, lies the frame or batten. Its upper and lower parts are each composed of two pieces of wood, fitting close together. Between them is imprisoned the comb or reed, composed of a series of very thin bamboo strips. Between each of these strips or teeth is passed a fine string, which serves the double purpose of keeping the teeth slightly apart and of fastening together tightly the two pieces of wood of which the batten is composed, and which imprison the ends of the teeth. The frame and reed together weigh heavily, and serve to force home the threads of the weft, after each journey made across the warp by the shuttle. Behind this, and situated in the pit are the treadles or foot-boards, by working which the weaver raises or lowers

the threads of the warp. They are usually two in number and are connected by cords with the under-portion of the heddles. The heddles are two frames, hanging from the roof across the warp, and composed in each case of two rods, one above and one below, connected by loops of thread. Each loop forms a figure of 8, in the centre of which is a small eyelet, through which pass the threads of the warp. One heddle with its thread-loops guides the upper threads of the warp, and the other the lower threads. As the treadles are worked, the heddles move their respective warp-threads up and down, while between each movement the loaded shuttle flies across the warp. Next comes the cross-bar, fixed to the ground on two pegs, and used for raising the warp. Behind the cross-bar the lease-rods lie across the warp, on either side of the cross-juncture of the threads. Lastly one sees the warp beam, about 4 feet long by 2 inches round. On this beam the warp is fastened in sections; and to support both warp and beam, a stout cord is fastened to the middle of the beam, then passed round a fixed pulley or a smooth post, and carried all the way back to a peg on the right hand of the weaver. As the weaving of the fabric progresses, the warp and warping-beam move slowly towards the heddles, reed-frame, and cloth-beam; and the weaver from time to time loosens the rope of the warping-beam, to allow the warp full play, and a further portion of the finished fabric to roll round the cloth-beam. Such is the simplest form of loom. The weaver, seated on the edge of the pit, presses his feet upon the treadles and works the two heddles up and down, and as the latter lift and lower the fibres of the warp, the weaver shoots the shuttle from right to left and back again through the warp. After each journey of the shuttle the weaver draws the reed-frame heavily against the edge of the web, thus forcing home the woof-threads. Occasionally, as in Bombay, the looms are arranged in an upper storey; and in such cases there is no weaver's pit. Instead the cloth-beam and warp-beam are raised off the floor by supports proportionate in height to the depth of the pit found in ground-floor weaving-rooms, and the craftsman sits upon a low stool of wood or cane.

THE FINISHED FABRIC.—The finished fabrics may be divided into the following classes:—(*a*) Pure silk fabrics, either plain or mixed with gold thread; (*b*) Mixed fabrics, such as "garbhasuti," in which the warp is cotton and the weft silk; "garbhasuti jari kinar," in which gold borders or ends are added to a mixed silk and cotton web; "reshmi jari kinar," in which gold borders are added to pure silk fabrics; cotton fabrics with silk borders; and lastly, silk and gold fabrics, or gold brocade. With the exception of such towns as Poona, Yeola, Surat, and Ahmedabad, most of the places in this Presidency, which contain hand-looms, turn out but a small quantity of silk apparel.

PAITHANI AS ORDINARILY WORN.

PAITHANI WORN LOOSELY.



a

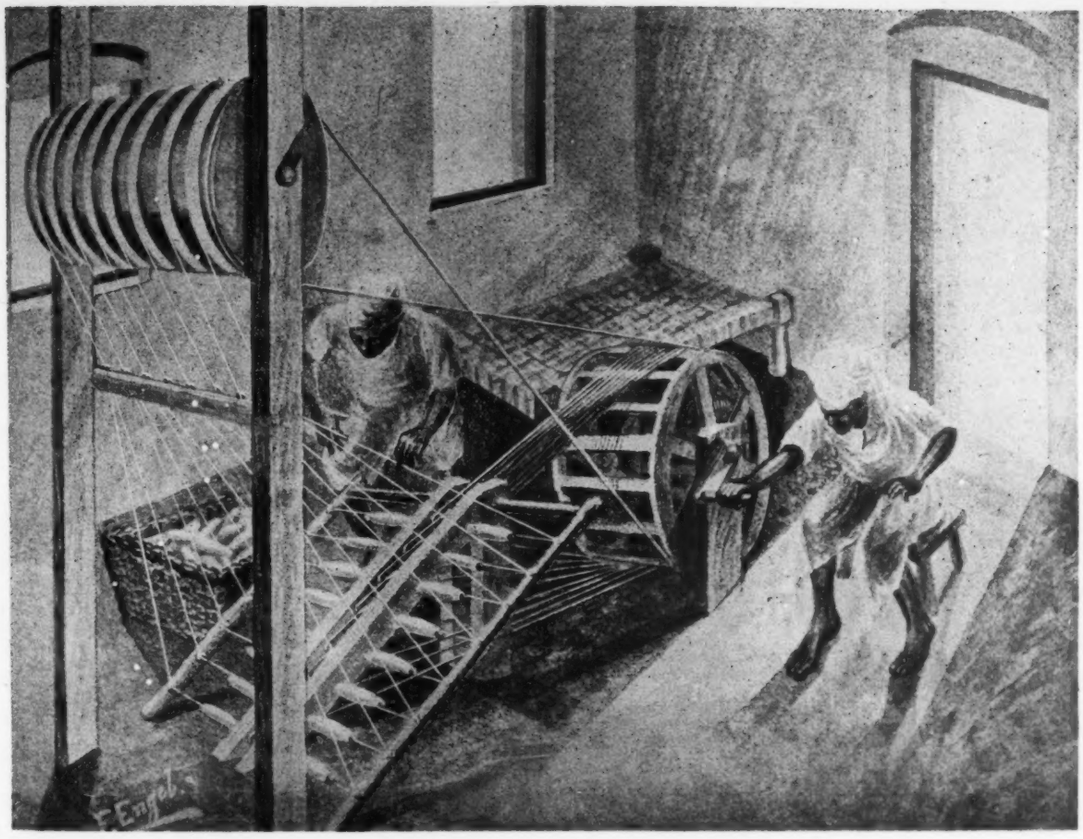
b

I.

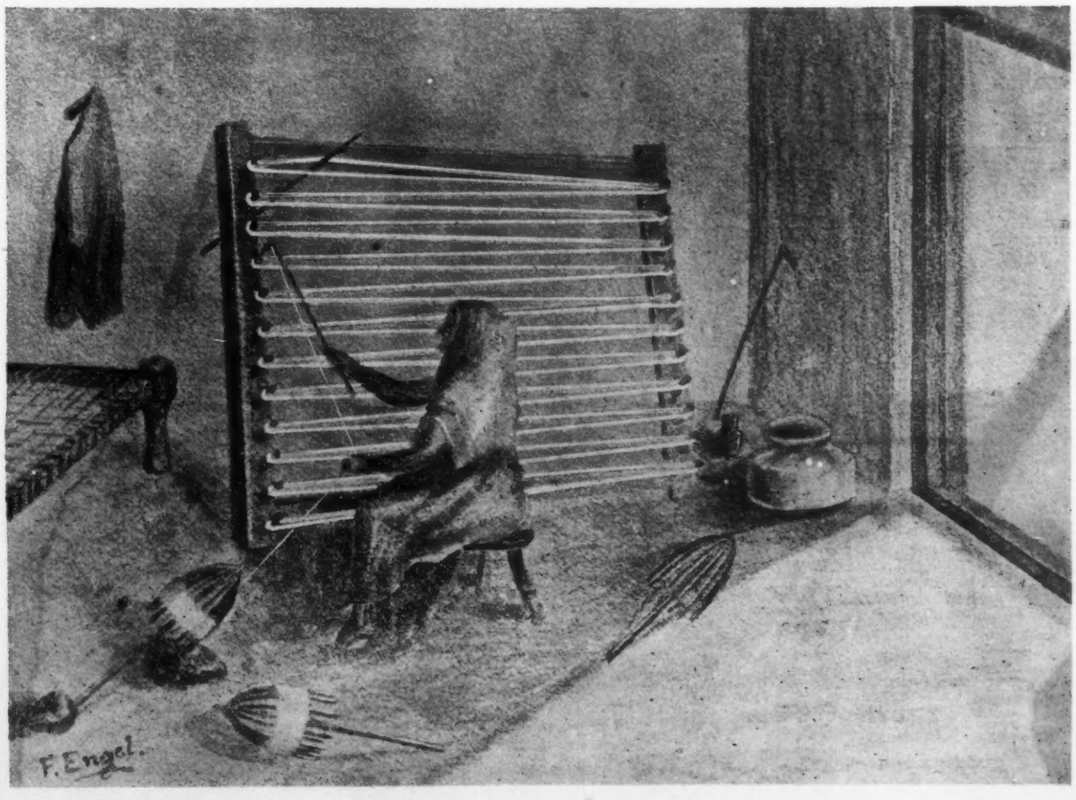
a. Sorting or winding silk from bamboo cage on to reels.

b. Spinning silk from reel on to bobbin by means of the small wheel.

(*Silk Fabrics of the Bombay Presidency*).



c

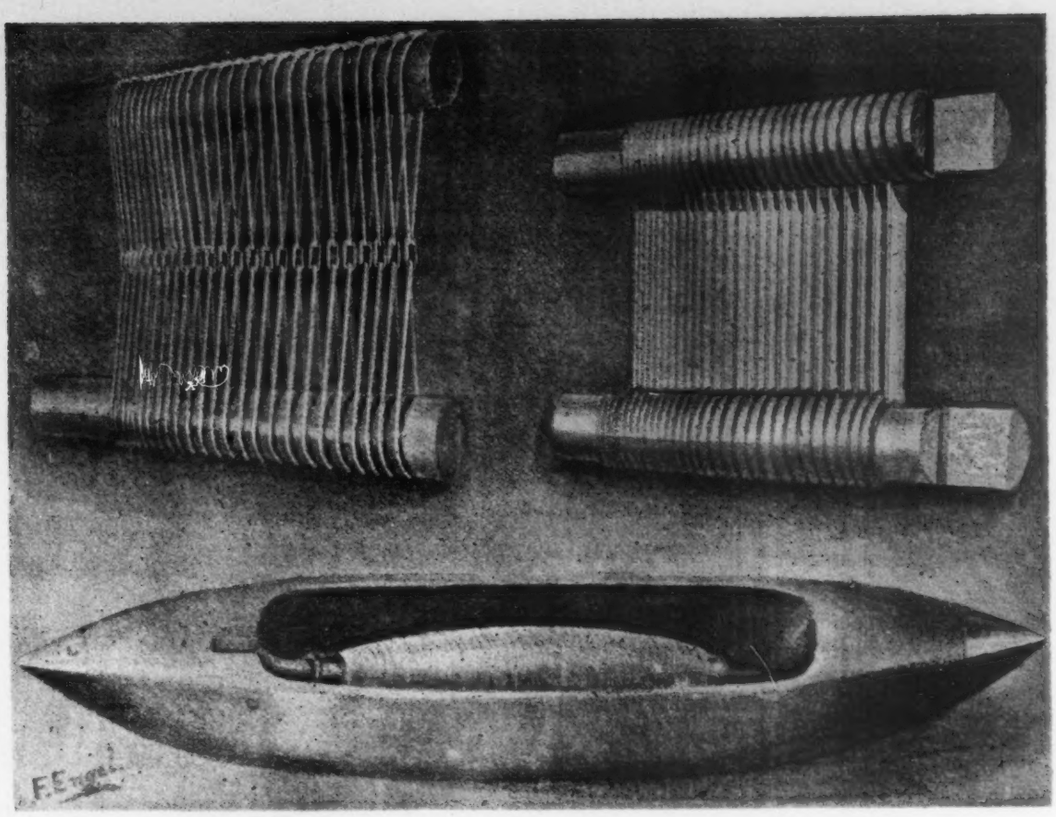


d

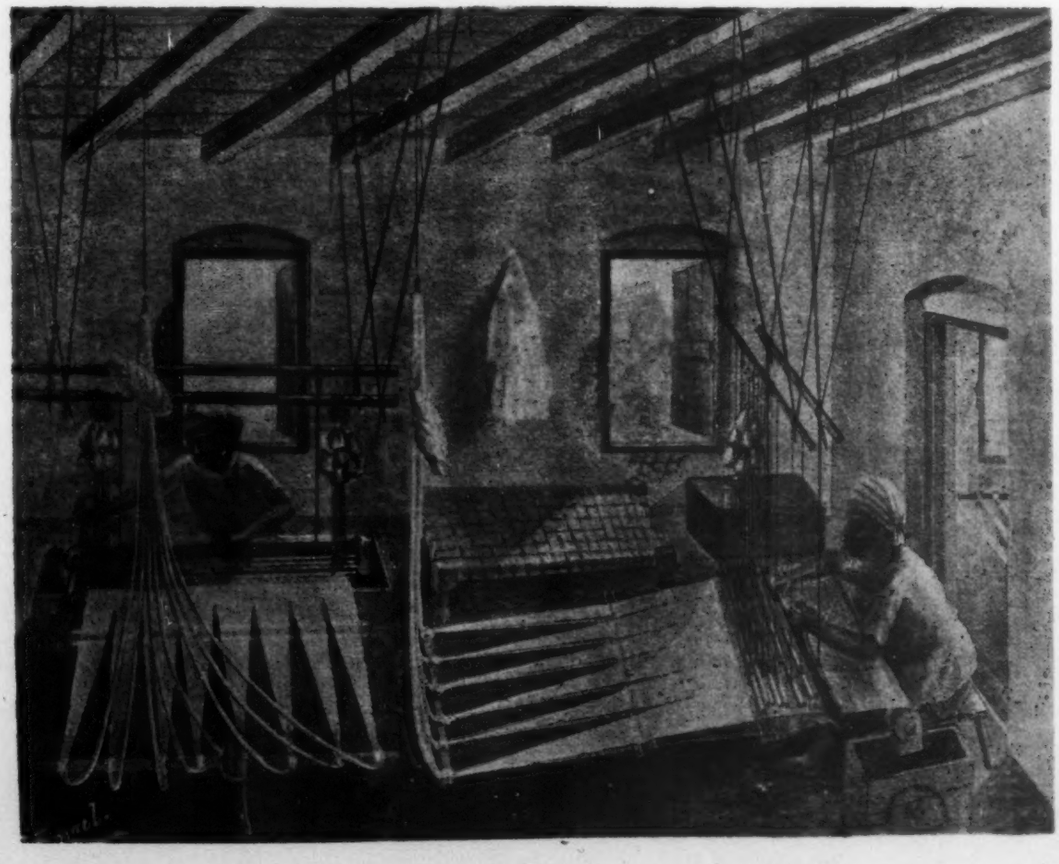
2.

c. Doubling, by transferring thread from bobbin-frame on to the drum.
d. Warping, showing warping-frame, crotch and reels.

(*Silk Fabrics of the Bombay Presidency*).



e



f

3.

e. Part of a heddle or heald, showing eyelets through which the threads pass ; part of a *phani* or comb ; the shuttle.

f. Weaving in an upper storey. The supports of the cloth-beam are fixed in old kerosine oil cases, filled with sand.

(*Silk Fabrics of the Bombay Presidency*).

SILK FABRICS OF THE CENTRAL PROVINCES.

By F. DEWAR, Esq., M.A. (Edin.), I.C.S.

Silk Industries in the past.—The earliest recorded attempt to cultivate the mulberry worm appears to have been made at Kamptee by Miss Calder in the years 1827 to 1831. The attempt was a failure. Trials appear to have been made at Nagpur also, but in 1836 these were acknowledged to have been quite unsuccessful. Years later in Seoni District more serious experiments were undertaken. In 1852 a Mr. Wood appears to have attempted sericulture, but there is no record of his proceedings extant. Then in 1869 Captain Brooke, Deputy Commissioner of Seoni, took the matter vigorously in hand. His notes, both on mulberry and tasar silk cultivation, form the most interesting part of the Central Provinces records on the subject. At first his experiments promised well, but in the second season he found that the mulberry tree would not grow well in the black cotton soil of the district, and the attempt had to be abandoned. In consequence of this failure, Captain Brooke gave it as his final opinion that, instead of attempting to introduce a foreign silk, efforts should be concentrated on the development of the indigenous article, tasar. Although it seems probable that the obstacle of soil was not one which would necessarily prove insuperable in other districts, the failure of this experiment had the effect of shelving the subject for many years. So far as my information goes, no further attempt was made until 1883, when the Deputy Commissioner of Chhindwara, under the instructions of Mr. J. B. Fuller, then Director of Agriculture for these Provinces, carried through a very interesting experiment. Its object was to ascertain whether the climate of the Satpura tract was suitable for growing Japanese silk on the system followed in Dehra Dun. The experiment, carried out on a small scale, was most successful. A supply of Japanese eggs was obtained from Mussourie, and the worms hatched out were fed on the mulberry trees growing in Chhindwara station. There seems to have been no difficulty at all here as to the growth of the mulberry. The silk produced was placed in the hands of experts, and was pronounced to be superior to ordinary Bengal silk, and even equal to some classes of European silk. I have found no record of any more recent experiment, and I am not aware of any private enterprise having stepped in to test the commercial value of the information gained from the experiment of 1883. The District Reports state that at the present day no cultivation of the mulberry silkworm is anywhere carried on, and on the past history of the subject they are, unfortunately, silent. The attention of the Local Government has of late been, in accordance with the advice put forward by Captain Brooke, turned rather to the protection of tasar cultivation than to the introduction of an industry about which satisfactory information had to a great extent been obtained, but towards which private enterprise and capital did not appear to be attracted. But although it has so far been found impracticable to domesticate the mulberry silkworm in these Provinces, there has for many years flourished an industry which imports from other Provinces mulberry silk-thread in a raw state, and works it up into cloths and ornamental borders.

I have been unable to determine the date when this industry originated. Tradition credits both Nagpur and Burhanpur silk with some antiquity, but I have found nothing on record to support the tradition. Burhanpur, under the Moghuls, was an important and busy city. Under the Mahratta and the British rule it has continually dwindled. It is therefore probable that its chief industry was founded in those days of prosperity, and has only persevered in later times because of the strong reputation then early established. But the silk industry there probably did not originate till the eighteenth century. In 1658 Tavernier visited the city and mentions of it—"There is made a prodigious quantity of calicuts, very clear and white, which are transported into Persia, Turkey and Muscovia, Polan, Arabia, to Grand Cairo, and other places." But he says nothing of silk or of the still more notable handicraft in gold and silver wire embroidery. On the other hand, as regards Nagpur, there can be little doubt that the experiments in sericulture undertaken early in the 19th century were suggested by the presence of a silk-weaving industry dependent on a supply of raw material from outside, and were due to the desire to furnish the weavers with locally-grown silk of the same quality. It can, I think, be inferred that in Burhanpur and Nagpur the weaving of mulberry silk has been an industry for at least one century, and probably for two.

The first authoritative mention of it which I can find is that made by Geoghegan, writing in 1872. After recording the repeated failures to introduce the "genuine silk-worm," he proceeds—"Though not producing silk from domesticated worms, the Central Provinces manufacture fabrics in which such silk is used, the supply being obtained either from Bengal *viâ* Mirzapore, or from China by way of Bombay. During the year 1867-68 the imports of silk were estimated at 228,862 lbs., of which nearly one-half was Bengal silk, about the same quantity from Bombay (*i.e.*, China silk), the remainder having been brought up from the Coast into the eastern districts. The imported silk is worked up on the looms of the Nagpur, Bhandara and Chanda districts, either into fabrics entirely of silk, especially women's *saris*, or into handsome silk fringes for *dhotis* and *saris* of cotton. These cloths with silk borders are largely manufactured at Nagpur, and find their way all over the Mahratta country." In this, curiously enough, there is no mention of Burhanpur or of its peculiar form of the industry in which gold and silver wire was interwoven with silk into extremely ornamental fabrics.

In 1874 the Chief Commissioner, at the request of the Government of India, organised a series of sericultural experiments and called for reports from all the districts. The experiments were confined to tasar, but in the course of the enquiry, facts were elicited about imported silk and were put on record in the Note compiled in 1875. The conditions shown differ very greatly indeed from those exhibited by Geoghegan in 1872, and it is unfortunate that in this Note no clear distinction is maintained between silk proper and tasar. The two accounts are very difficult to reconcile. In the former no mention is made of Burhanpur, but Nagpur is credited with a large industry solely engaged on working up mulberry silk. In the latter the place of importance is given to Burhanpur, and Nagpur is said to work only in tasar silk.

In 1883, when another revival of interest in silk industries occurred, a collection of fabrics was received from the Central Provinces and placed in the Indian Museum, Calcutta, where they are still to be seen. These fabrics are of fine cotton and silk thread, in colours, with well worked silk borders, from Pauni and Andhargaon in

Bhandara District, from Umrer in Nagpur, and from Burhanpur. In the 1875 Note no mention of silk, as distinct from tasar, was made in regard to Bhandara District. Geoghegan had mentioned it, however, as working up mulberry silk. It would seem that the industry persisted up to 1883, and was well recognised. In the *Gazetteer of India* (1886) it is stated that in the town of Pauni "a considerable trade still exists in cotton cloth and silk pieces; and the finer fabrics manufactured in Pauni are exported to great distances."

To show the state of affairs at the present day, I can offer only the rough estimates given in the district reports. In Nagpur there is said to be a silk population not less than 6,000 and probably more. In the Nimar district report it is stated that the number of professional silk weavers in Burhanpur now is approximately 1,700, distributed in castes as follows:—Salis, 850; Koshtis, 350; Momins, 500. These figures exclude wire-drawers, flatteners, and *kalabutun* spinners. In Bhandara there is a population of some 4,000 people engaged in working up Bengal silk. The industry is carried on in the towns of Pauni, Andhargaon, Bhandara and Mohali. In Chanda, the only trace of the industry which remains is the habit of tasar-weavers who import a few Bengal cocoons and wind them off along with the tasar cocoons of the district. The silk population of to-day (1901) is, therefore, little less than 12,000, which marks a very striking rise since 1891. At no date for which we have statistics would the imported silk industry seem to have been so prosperous.

This then is the history of imported silk so far as it can be elicited from scanty notes and census returns somewhat tediously manipulated. Up to 1868 the industry flourished, but immediately after that date it suffered a great and sudden decline, caused by the importation of Manchester goods. From 1872 to 1891 it was practically stationary, although generally believed to be in a declining state. And in the present year (1901), although the district reports still speak of the industry as a sadly degenerate one, it has, in point at least of numbers, made a very rapid advance in Nagpur, Nimar, and Bhandara. The other districts have almost entirely ceased to import raw silk.

Imported Silk in Nagpur.—The supply of raw silk is at present obtained chiefly from Maldah in Bengal. Some years ago the Rajshahye Division also exported thread to Nagpur, but the weavers found it rougher and more difficult to work, and fell back on the finer article from the filatures of Maldah. This silk is spoken of as being both in yellow and white skeins. The report makes no distinction between Bengal tasar and Bengal mulberry silk, and as Maldah has a large interest in tasar as well as in mulberry silk, I suspect that the yellow skeins spoken of may be Bengal tasar. If so, it would seem to be wound along with mulberry silk, a practice which corresponds with that followed by the tasar-workers of Chanda, who draw threads partly from Bengal cocoons and partly from local ones. No mention is made of any importation from Bombay, and this may possibly have ceased unless the very cheap and shoddy European silk used by the Patwis for fashioning necklets and bracelets is brought in through that port. This stuff is never used for weaving, and as it is sold for Rs.2 per seer it is probably some form of silk waste. There is a small import of raw silk from Benares.

The imported silk in its raw condition is of six qualities known by the following descriptive names:—The *lalkatna*, red thread; the *dó-tana*, double thread; *koré-ká-katná*, undyed stuff; *awál-bharna*, first crop; *majholá-bharna*, intermediate; *narám-bharna*, soft. The prices of these range from Rs.16 to Rs.10 per seer. The importation is done by large dealers, who also to a great extent control all the processes of the industry, paying for the spinning and dyeing by piecework and subsidising the actual weavers.

As has already been noted, the winding of the silk is done by women. These belong usually to the Koshti caste, but Kalars, Mahars, Barhais and Musalmans are also engaged. A woman can clean and wind a seer of the raw silk in eight days, and her earnings are 12 or 13 annas per seer, or about 1 anna 6 pies per diem. If the estimates of the district report are correct as to the number of winders and the total value of the raw silk annually imported, it is obvious that all the 5,000 female winders in Nagpur cannot be continuously at work for more than half the year. This is very probably the case. There does not appear to be anything peculiar in the winding process. It consists of alternate stretching and winding on large and small wheels until the silk is finally made up into equal skeins ready for dyeing. The winder's fingers appear to be the chief instrument for the cleaning and glossing of the silk, and irregularities are worked out by stretching and by pressure of the fingers as the thread passes from wheel to wheel.

Then comes the dyeing. This is done by the Patwis or braiders already referred to. They are a class distinct from the cotton dyers, and there are only 15 of them regularly at work in Nagpur city. The process also is not complicated. The skeins are first washed in water containing a mixture of lime and the ashes of plantain wood. They are then washed with pure water and are dipped in alum water before the dye is applied. The dyes themselves are thoroughly boiled and skimmed before the silk is set to steep in them. They are simple and not numerous. No fugitive aniline dyes are used. Only three colours are produced—yellow, *pistai* (the colour of the pistachio nut), and *kirmani* (worm-coloured or crimson). The ingredients would appear to be lac, haldi or turmeric, and the powder of the kamela fruit. The dyers when in full work make very good wages.

Most of the silk is woven into the borders of cotton cloths, *dhotis*, *lugras* (or *saris*) and *upernas* (scarves). This is as it has always been. Even in 1867 very little cloth of pure silk was manufactured. Besides Nagpur and Umrer, there are nine smaller towns or villages in which the weavers live. Those in Nagpur turn out *lugras* chiefly, those of Umrer *dhotis* and *upernas*.

The dealers complain of the competition of foreign machine-made goods. The people recognise that these are inferior and less durable, but are attracted by their cheapness. There is, however, no immediate likelihood of a decline in the industry. The weavers are less independent than their brothers in the tasar trade. They frequently get their silk thread on credit from the importing dealers, and consequently become dependents, paying back woven cloths in return. The dealers, on the other hand, say that their business is a risky one, since it is not always possible to realise from impoverished weavers the value of the supplies advanced to them.

Imported Silk in Nimar.—In Nimar District the silk industry is mated with another more unique and more famous—the manufacture of gold and silver thread, which is woven into silk cloths. The combined industry

is a peculiarly oriental one. As a matter of course it has, like the making of hand-made lace in Europe, suffered in these days of excellent machinery and practical economy. Time was when the looms of Burhanpur were busy with elephant cloths and royal robes and tapestries that were literally worth their weight in gold. Such are still preserved as heirlooms by native princes.

Burhanpur city was at its best under the Moguls, when it was the capital of a royal province. The Mahratta rule diminished its industries, and of late it has still more greatly dwindled. It is difficult to tell exactly how its silk and gold thread industry has been affected by the advent of the British Raj. At first, without doubt, it fell off greatly. But the census figures about this industry were doubtful. According to them, the population engaged on the combined business never amounted to more than a few hundred; in the present year (1901) it is reported that there are 1,700 professional silk weavers and 1,360 gold and silver wire drawers in Burhanpur. It would appear that of late years there has been improvement, and that the industries are unlikely to decline below their present position. There are numerous highly skilled workmen who only await an opportunity for putting forth their best work (not now called for), and the supply of raw material is secure. There is the inevitable competition with inferior and cheaper goods, however, and this would seem to have had the effect of deteriorating the staple of the Burhanpur outturn.

The chief supply of material is brought from Poona. This is Chinese silk, and as imported it is spun and dyed ready for the loom. But there is also a considerable amount of stuff from Murshidabad in Bengal. This when imported is in a raw state, consisting simply of rolls of fibres. Partly owing to this fact and partly because the silk thread used by the Burhanpur weavers is finer than that of Nagpur, the expenses of cleaning, winding and spinning the silk are heavy. When thread is wanted for *kalabutun* (*i.e.*, silk cloth interwoven with gold-plated silver thread), it costs sometimes as much as Rs.7 per seer to prepare it from the raw material of Murshidabad. The thread is first cleaned and sorted by Dalia and Teli women. Work on one seer takes a whole month, and the women are paid Rs.4 per seer. This is considerably better than the wages earned by female winders in Nagpur, perhaps because there are fewer workers. In Burhanpur there are only 350 or 400 women engaged in winding. The spinning and doubling of the thread is in the hands of a very few workers; they are paid Rs.2 per seer of silk spun. The thread is then ready for ordinary silk weaving, but if intended for *kalabutun*, it goes through another process at the hands of Dhimars, who twist six of the threads into one.

Very little cloth of pure silk is now woven. Pagris are made of silk alone, but its use is as a rule confined to the borders of *saris*, *dopattas* (shawls) and *phentas* (waist-bands), of which the main body is cotton. Besides these, a fabric is turned out in which cotton and silk are mixed throughout the body of the cloth, and to such cloth borders of silk and gold thread are occasionally added. The weavers, however, on the receipt of specific orders, turn out very fine pure silk cloths with more or less elaborate borders. Their average earnings are from Rs.5 to Rs.8 per mensem, which is not high remuneration for skilled labour. As in Nagpur, many of the weavers are financed by dealers. These advance the silk thread and pay for labour 2½ annas per yard of pure silk work. In the case of silk pagris, the most satisfactory of the Burhanpur products from a commercial point of view, it takes a man very nearly a day to turn out a piece a yard long by 7½ inches wide; his wage is therefore less than Rs.5 per mensem. When a fabric of mixed silk and cotton is wanted, the silk alone is supplied by the importer, and he pays for labour 4½ pice per yard. Of this the weaver has to spend 1½ pice in cotton thread, and makes therefore only 3 pice per yard. The weaving, however, does not in this case occupy so much time. A weaver working independently makes a slightly better profit, but it does not often rise much above Rs.5 per mensem.

The workers in gold-plated silver thread are no more prosperous. The processes of the preparation of this article are simple. A bar of silver is first cunningly covered with gold leaf. The bar is then, with much manual labour, converted into fine wire by being repeatedly drawn through smaller and smaller holes pierced in a steel plate. It is then twisted with a silk thread and is ready for weaving. Intertwined with silk thread, it is introduced into rich borders and patterns in the body of the cloth. But the fine heavy *kinkhob* and embroidered *mashrua* are no longer in demand. These fabrics, from the amount of silk involved in the work, pay both spinners and weavers better than the more common cloths. They can still be turned out to order, but orders are few and far between. The *kinkhob*, in particular, was a material largely in demand among native princes when money was lavishly spent on pomp and ceremonial; but during the last fifty years this demand has fallen off, and it is now practically non-existent. Even when finer fabrics than ordinary are ordered, the artizan does not make his former profits, since, being without capital, he works as a skilled labourer only. As a rule, the silver thread is now but sparingly used to enhance the beauty and value of the more ordinary silk and cotton fabrics. Even here there is competition, for imitation gold thread is imported from Europe and occasionally used.

There is no appearance of a decline in the demand for Burhanpur products, but these have to meet a strong competition with cheaper and less fine stuffs from Nagpur, Benares, and Ahmedabad, as well as with highly coloured machine-made silks from Europe. Owing to this competition and to the lack of capital in the hands of the weavers, it is probable that the quality of the Burhanpur fabrics will gradually degenerate. It is unlikely that new economic conditions will arise to improve the staple of the industry.

Imported Silk in Bhandara.—The silk industry of Bhandara District is an offshoot, but a long-established one, from Nagpur, and (as in Nagpur) it would appear at the present day to be not only maintaining but improving its position. In 1871 it had a silk population of some 1,500, and very much the same number in 1881. These figures include tasar-workers, of whom until recently there were many in Bhandara. But in the present year (1901) it is reported that there are 950 houses, or at least 4,000 people engaged in the industry. The towns of Pauni and Andhargaon have long been homes of mulberry silk weaving, and at the present day there are silk-workers in the towns of Bhandara and Mohali also.

The material comes from Bengal and usually through Nagpur. Pauni uses the largest share of this, and in all silk thread worth about Rs.60,000 is annually brought in. This is almost entirely Bengal mulberry silk, but a small quantity of Bengal tasar is also imported. The material imported is not silk fibre, but thread already

wound, and frequently already dyed, in Nagpur. Its cost is Rs.20 per seer, and when dyed, Rs.29. These are obviously very high rates. But the Bhandara industry would seem to be almost entirely confined to weaving. The fabrics produced are usually fine cotton cloths with a border of coloured silk. Specimens of these, sent up from Pauni in 1883, are to be seen in the Indian Museum, Calcutta. The fabric now produced is less elaborate than it used to be, and the quality, as in Nimar, has suffered from competition with machine-made goods. Cotton *dhotis*, *lugras*, and *upernas* are ornamented with a coloured silk border. This is of very simple design, about 3 inches wide, and is made up of the same colours as are used in Nagpur, as is to be expected, seeing that much of the thread is imported ready dyed. The colours are shades of crimson, green, and less usually yellow. A crimson border with a green strip in the middle, the green being set off with lines of white thread, is a common pattern. But the colours run in strips only and are not worked either into mathematical designs or such patterns of flowers and fishes as are to be seen in tasar work. The cloths thus ornamented fetch twice the price of plain cotton, being sold at 10 annas per yard. Occasionally pure silk fabrics are made. They are usually large silk handkerchiefs with a yellow border, and they cost from Re.1 - 14 to Rs.2 - 12 per yard. The staple fabric, however, is the silk-bordered cotton cloth. This is, as a rule, not sold locally, but is exported to Poona and Bombay. Exportation has always been the rule in the Bhandara industry.

Although the extent of the craft has increased, and although the export demand is still steady, the profits of the weavers are poor, not usually exceeding Rs.5 per mensem. This is probably due to the fact that their material is not imported in a raw state and worked up by their own families. Nagpur has a monopoly of the cleaning and winding processes, and a comparison of the prices paid for prepared thread in Bhandara with the price of raw fibre and the cost of cleaning, winding and dyeing in Nagpur, will show how large the profits of the Nagpur importing dealer must be.

Cultivation of the Worm.—The tasar worm (*Antheræa mylitta* or *Paphia*) is fairly hardy and can be found in the jungles of almost every district in the Central Provinces. It prefers, however, a fairly warm and moist climate, and consequently its cultivation in the more northern districts has not become general. Its principal habitat is in the districts and feudatory states of the Chhattisgarh Division, and in Chanda District. The food of the worm is various, and it can be induced to thrive on almost any tree whose leaves are sufficiently large and sappy. But in these Provinces the saj (*Terminalia tomentosa*) is the tree on which it is most usually to be found in a wild state, and it is on the saj that the jungle tribes usually cultivate it. Other favourites are the sal (*Shorea robusta*) and the ber or plum tree (*Zizyphus jujuba*). But the yen, the tinsa, the ajar, the dhaura, the dhaba, the lendia, and the castor-oil plant also furnish it with suitable food. Indeed, in Chanda District, the cocoons are to be found attached to grass stems out in the open, and it is to be presumed that the worm before spinning is fed upon grass. The worms eat voraciously, and an average crop strips a considerable area of jungle.

The breeding season differs slightly in different districts; but the general rule is that the worm or pupa, which has lain within its cocoon during the cold weather and the spring, emerges as a large and very beautiful moth at the end of the hot weather or at the beginning of the rains. The moths copulate, eggs are laid, and worms hatched. The worms feed on shrubs and trees for a period varying from one to two months. Then they spin cocoons, only to emerge again in a few days as moths, and go through the same incarnations as eggs and worms until the final cocoon is woven to be a winter shelter.

There are therefore two courses open to the rearer. If worms are plentiful, he does not need to begin operations till July or August, when he gets in the jungles a supply of wild cocoons, the first crop. From these he gets a supply of worms which he feeds until they spin their winter cocoon. But where wild cocoons are not readily to be found in the jungle, the rearer must preserve a few seed cocoons from his crop of the previous winter, and must feed the first as well as the second crop of worms. The first crop of cocoons which he grows he does not sell; they are still seed cocoons to him. The second crop is not ready till October, November, or December. The work of the rearer therefore extends usually from the middle of June to the middle of October or November; and it is only at the end of October, at the earliest, that the weavers obtain a fresh supply of raw material and can begin their weaving season again.

The Spinning and Weaving of Tasar.—The spinning and weaving of tasar are not two independent industries. They are not locally independent, there is extremely little exportation of silk thread from one district to another, and there is not, as in Nagpur and Bhandara, a class of women who wind and spin tasar as an independent occupation. All the working up of material from the cocoon to the finished cloth is done in the Koshta's own household. The women unwind the cocoons; that is a business in which men never take part. Men and women share the tasks of spinning, stretching and dyeing. The actual weaving is the work of the man alone.

In November or December, the Koshta, usually at the local weekly bazar, secures his supply of cocoons for the year. The more well-to-do he is the larger will be his supply, for if he neglects to buy enough at the beginning of the season, he will find it either difficult and expensive or quite impossible to supplement his stock afterwards. If he is poor, he buys as many cocoons as he can, and when his stock begins to run short, he saves it by working chiefly in cotton and using a few tasar threads for borders only. Many tasar weavers find it expedient to add agriculture to their own industry. It occupies them and their families during what is, from the tasar-weaving point of view, the slack season, the rains, and the early part of the cold weather.

The cocoons as the Koshta receives them from the breeder are hard, gritty, and as unlike silk as can well be conceived. His first business is to soften them so that they can be unwound, and to kill the pupa inside, which might otherwise emerge when its natural winter exposure is interfered with. To effect this the cocoons are first dried in the sun, and then boiled or steamed. The process differs slightly in different districts and even in different households. The skilled weaver is apt to have an infallible recipe of his own for rendering the cocoons workable. Usually a *handi* (or big open-mouthed clay pot) is filled with water and set to boil over a steady fire. With the water, wood-ashes and alum are mingled. The ashes used are various, but the chief point seems to be that the wood or stalk from which they come should be of an oily nature. The castor-oil plant, "Till" stalks,

the "Bemchi," "Jagni," and "Dhotra" are used for the purpose, besides many others. The ashes are sometimes tied up in a bag and placed in the water, and sometimes are merely mixed in loosely. On the surface of the water a tray of grass or straw is placed, and on this the cocoons are laid, two or three hundred to each pot. The boiling is kept up steadily until the water is all evaporated from beneath the grass mat. The cocoons are then tested; those sufficiently soft are laid aside, those still unready being further steamed. When properly softened, cold water is poured over them to remove the ash, and they are set to dry. The gummy matter is now gone and the cocoon is a soft brown skin with the dead pupa inside.

Next comes the woman's peculiar work, the unwinding of the cocoon. The woman sits on a verandah with her legs straight out before her, the left ankle lying across the right instep. On her left she sets a small saucer containing the cocoons to be unwound, and their number varies according to the strength of thread required. From 6 to 8 is the usual number for the better kinds of thread, but in the rains, when cocoons are at a premium, I have seen as few as 3 or 4 used. The outside silk has first to be pulled off. It never unwinds steadily, and a good deal of waste results. But after this peeling, a filament pulled from a cocoon that has been properly softened will come away steadily and easily, without either breaking often or moving the cocoon about. The woman gathers the several filaments together in her left hand and places them against a roller, usually called a *natwa*, which she holds in her right hand. It is a spade-shaped piece of wood with a short handle and rounded-off edges. Holding the ends of the fibres against the *natwa* with the thumb of the right hand, she proceeds to unwind, twirling the handle round three or four turns at a time, and at the same time throwing her hand upwards and outwards. Meanwhile the left hand is busy drawing out and passing on the combined thread that flows from the cocoons. During each upward throw of the right arm and twirl of the *natwa*, the finger and thumb of the left hand make three or four passes up and down the thread, and as the thread goes across it gets a rub between the left palm and the thigh. In practised hands the work goes on very speedily and accurately. With bad cocoons, and especially with pierced cocoons, the breaks are frequent. When these occur, the winder bends over the saucer and with wonderful accuracy pounces on the broken end of the fibre, dips her fingers into a bowl of tamarind and water which is at hand, rolls the end into her thread and spins on. The *natwa* varies in shape in different localities. In Chanda it is not a solid piece of wood, but a framework in the shape of the perpendicular middle section of a truncated cone. As on the outside, so on the inside of the cocoon there is apt to be waste, the fibre sticking to the pupa shell and not unwinding freely. But the amount of this waste depends chiefly on the thoroughness of the softening of the cocoon. The thread has a very good appearance as it is first unwound and lies round the *natwa*, a gleaming belt of a fine dull-gold colour. But the method is extremely primitive. It is much the same as that which was, at the beginning of the 19th century, practised in some parts of Scotland for the spinning of woollen thread.

The succeeding processes of spinning or twisting and of doubling or throwing the thread are no less rude. Small wheels or *rahats* are used which are turned with a handle, and there is a good deal of diversity as to the manipulation of the thread. To twist or spin the thread as it lies on the *natwa*, it is transferred to another and larger *natwa*, and the twist is given by holding the two spindles at an angle from each other, one being held and twirled off in the left hand, and the other in the right hand receiving the thread. But the twist given is not great. To add to it, a good workman will again transfer the thread from the larger *natwa* to a spinning wheel which he works with his right hand. Occasionally two persons are employed at this, one holding the *natwa* and allowing it to revolve and unwind the thread, while the spinner works his wheel with the right hand and gives the thread a twist round a finger of his left hand as he works. Or the skein of thread can be put round an upright drum or cylindrical frame (*chhati*), which revolves on its axis and lets the thread unwind. This evades the necessity of two workers, but methods differ according to the numbers and resources of a household.

The dyeing of tasar is done by the weaver and his own family, and usually thread is dyed only for fringes and borders. The main body of the cloth is left in its natural colour, partly because the weaver's taste tells him that it is better so, and partly because it is cheaper and easier. Tasar is not an easy thread to dye, but the few vegetable dyes in use give good artistic fast colours. Red and yellow are the most usual colours for borders, but blue is also used, and a dark blue which is all but black. For the crimson colour lac is used, for yellow the pollen of the kamela fruit with or without turmeric, and for the blue and black the juice of myrabolams. Turmeric by itself does not give a fast colour, but women's *saris* sometimes have the main body of the cloth dyed with it, and the effect is not so good as the natural colour of tasar. Of late some Koshtas have taken to the manufacture of check patterns, which they make by running narrow lines of crimson or black along and across the cloth. The effect of this also is poor. In the process of dyeing, the skeins are washed through a little lime and water, then steeped in alum water and laid in a pot of boiling dye.

The weaving of tasar does not differ from the weaving of cotton, except that it calls for more careful work, and more elaboration in the border patterns. All the implements are the same as those used for cotton. The warp is first got ready. It is often of stronger thread than that used for the weft, being perhaps five-ply (*i.e.*, 30 fibres) when the weft thread is three-ply (or 18 fibres), but often also the two threads are of equal thickness. The warp is stretched between two parallel bars, and bits of split bamboo are thrust across it to separate alternate threads. By pushing these slips along from one end of the warp to the other, all threads are straightened out into their proper positions. It is at this stage, of course, that the coloured warp threads for the borders are laid out. To ensure a uniform stretching of the thread, a thick brush is pushed along, and any thread which has slack to spare is tightened up.

The loom is a simple piece of machinery. The weaver sits on the ground with his feet in a small pit, and across his knee is the roller, to which the ends of the warp threads are fastened, and round which he rolls the completed cloth every few minutes as he works. In front of him swings the comb, the frame of which is usually covered with rude carvings. It swings freely from the roof, and the weaver pulls it to him sharply with his hand after every double passage of the shuttle to close up the woof. Between roller and comb is a bamboo bow fitted

with pins at the ends which, when the pins are thrust into the edges of the woven cloth, keeps the width regular. Often two short bamboos are used, overlapping at the middle and with their inner ends secured to each other with string. Immediately behind the comb hangs a rod from either end of which is suspended a small pulley-wheel. From these two pulleys hang the "separating-rods." To one rod (by strong cotton thread or string loops) are fastened all the warp threads of even numbers, and to the other all the alternate threads. Each rod has a rope looped to it, which fastens to the weaver's feet. By working his right foot down, he pulls down half the threads and, as the rods hang from the same pulleys, he also pulls up the other half, thus leaving an opening like the opening of a book, across which the shuttle can be thrown. By pressing down with his left foot, he reverses the action—so that all threads previously under the shuttle are now above its passage, and all that were above are below. Behind these again hang similar separating-rods which command the warp-threads of the coloured borders. There may be from two to six of these according to the complexity of the pattern, and they do not interact with each other on pulleys. Each is hung separately over a pulley at the roof, the other end of the rope being evenly weighted, so that the horizontal rod can be depressed by a touch of the weaver's fingers, being raised again by another touch. It is a fair analogy to say that the rods of the warp-threads for the main body of the cloth are worked by the performer's feet like the pedals of an organ, while the border rods are the organ stops worked by the hands. One of these border rods may lift only two threads at each side of the cloth, another may lift twenty, according to the pattern.

Just behind the weaver is a post to which a rope is fastened. This rope passes round a peg at the other end of the room, and is then tied to a rod at the further end of the warp. It keeps the warp lines taut, and from time to time, as his work progresses and the finished cloth is to be rolled up, the weaver has to untie the rope from the post and slacken it out. The motions follow each other in the following order—a downward pressure of the right foot in its rope-stirrup to split an opening across the warp—a throw from the right hand to the left down that passage of the shuttle carrying the woof thread—a downward pressure of the left foot and raising of the right to reverse the upper and lower planes of thread ; another throw of the shuttle from left to right—a pull with the left hand of the comb sharply inwards to close up the newly-thrown woof-threads—simultaneouslv a quick manipulation of the right hand raising and lowering the separating-rods of the coloured border threads. This latter is the point which calls for skill and memory, and a weaver can turn out two unbordered cloths in the time it takes him to make one with coloured pattern borders. In the case of a pattern where coloured woof threads have to be used for the border, the weaver has three shuttles to work for every line, two for the borders and one for the main body of the cloth.

The profits made by tasar-weavers are, as a rule, better than those made by silk-weavers in Nagpur and Nimar, where the craftsmen are in the hands of capitalists. A cloth very frequently made is the *jatha* or *dhoti* and *do-patta* made in one length, with a division where the cloth may be cut by the buyer. It has a coloured border, is usually woven of four-fold thread, and is from $7\frac{1}{2}$ to 8 yards long. Its price varies about Rs. 11. This cloth would require above 100 cocoons per yard, or say, 1,000 in all. The weaver's profits on each cloth are Rs. 4, and he is able to make between two and three of these per mensem.

It is clear that the work is, on the whole, and especially to a good workman, better paid than is silk-weaving in Nagpur and Nimar. But employment is apt to be irregular, depending as it does on a limited supply of cocoons. For several months in the year a tasar-weaver may have to resort to cotton, using only a few tasar threads for borders, and his profits at this work are not good. But the industry provides a reasonable competence, especially to the Sambalpur and Bilaspur weavers. Yet their numbers are declining because there is not a sufficient supply of raw tasar to keep the looms busy throughout the year.

Conclusion.—It would seem to be clear that the imported silk industry in the Nagpur, Nimar and Bhandara districts is in a prosperous condition, and may be expected to improve. From the recent returns of rail-borne traffic it appears that year by year the import of raw silk from Bengal increases. Even in 1899-1900, during half of which famine conditions prevailed, the import was 2,491 maunds, valued at Rs. 12,50,936 as against 2,191 maunds, valued at Rs. 10,99,589 in 1898-99. The industry is well able to hold its own against the competition of machine-made silk. There has been, however, a decline in the quality of the staple fabrics. The condition of the workers also has declined as the industry spread, and now it seems not improbable that the next step may be the introduction of machinery, in Nagpur at least, and the reduction of the weavers to the position of factory hands.

The position of the tasar industry is doubtful. If the statistics gleaned from census tables are to be trusted, the trade is gradually dying out. There has been a fairly steady decline since 1872. The standard of workmanship has not, however, perceptibly fallen, and the local demand for tasar fabrics is strong enough to ensure fair profits to the workers. The question of the supply of tasar cocoons is the only pressing one.

a

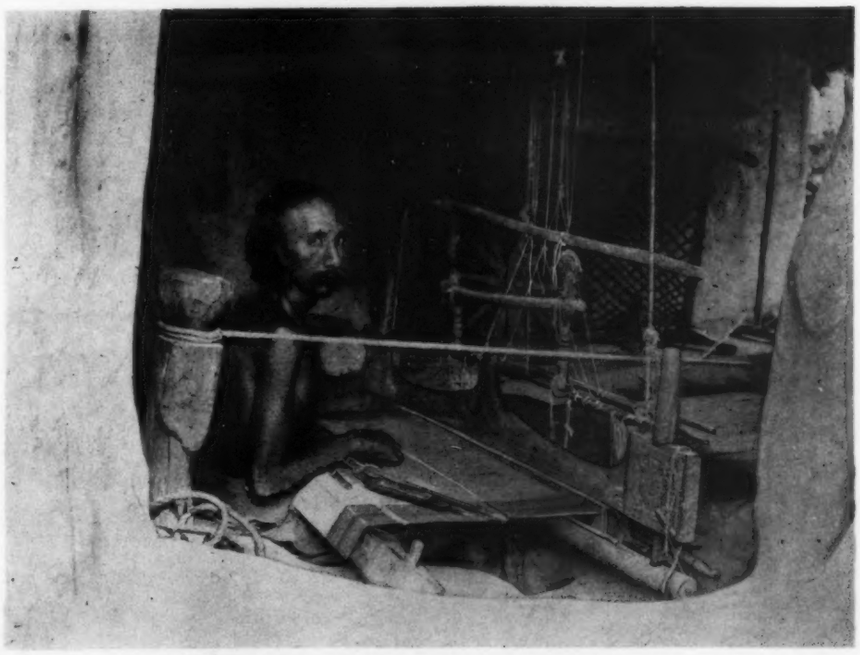
b

4.

a. Woman reeling tasar cocoons.
b. The *asari*, *chhati*, and *jantur*.

(*Silk Fabrics of the Central Provinces*).

c

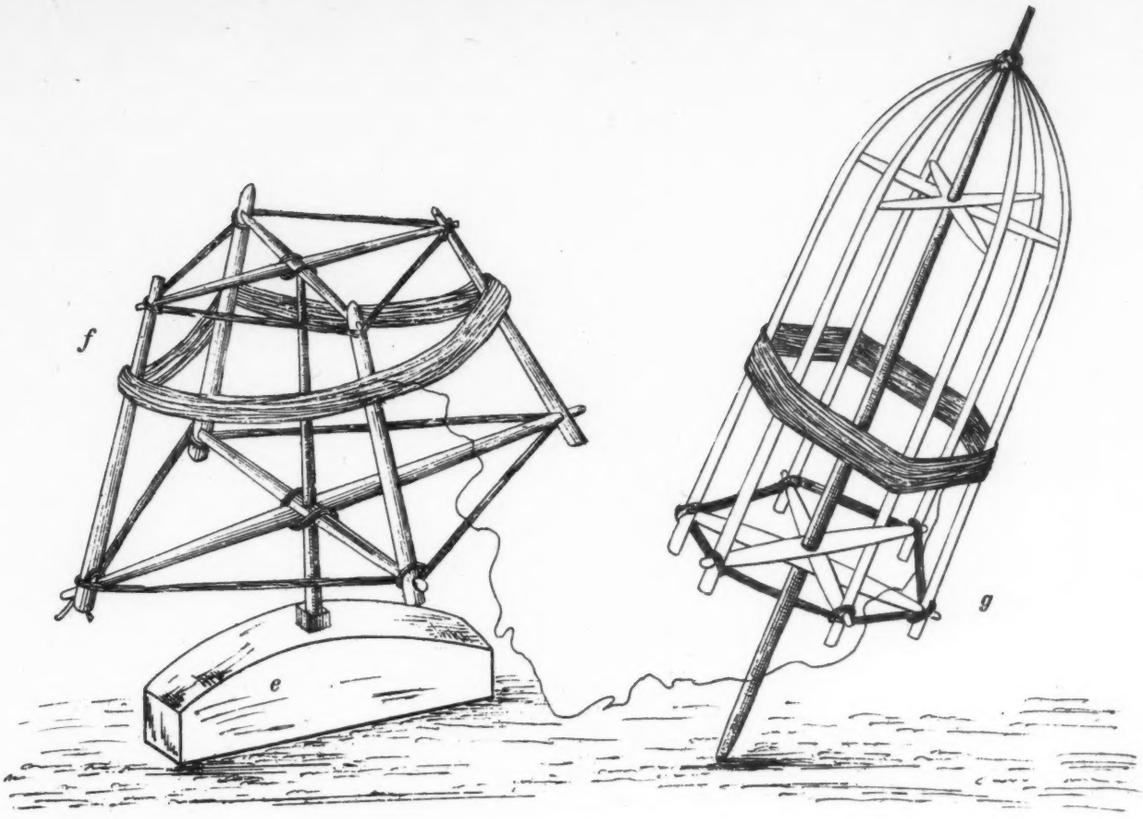


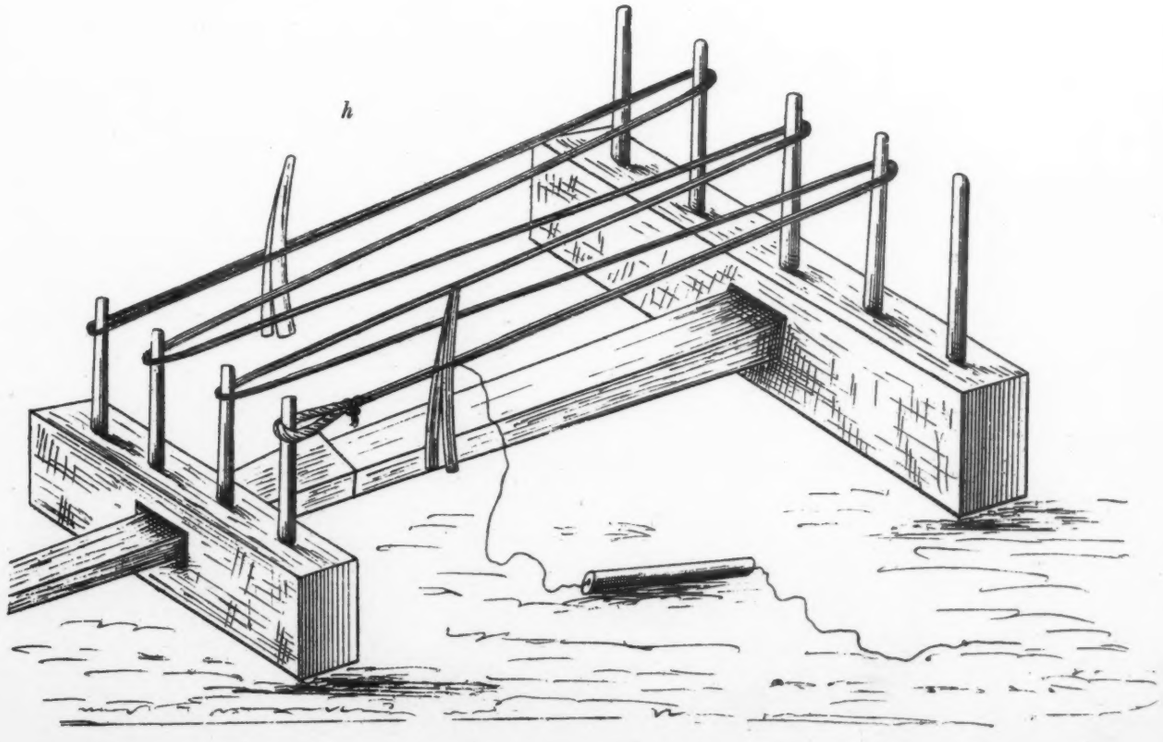
d

5.

c. The laying of the warp.
d. The loom.

(*Silk Fabrics of the Central Provinces*).





6.

e. Sulli. f. Chhati. g. Asari. h. Jantur.

(Silk Fabrics of the Central Provinces).

SILK INDUSTRY IN THE PUNJAB.

By W. M. HAILEY, Esq., C.S.

For practical purposes silk-producing *Lepidoptera* may be said to be divided into two main classes, "mulberry fed" and non-mulberry fed" silkworms. The former are usually known as "domesticated," the latter as "wild," though as a matter of fact there are several species of non-mulberry feeding silkworms which have been continuously reared in a state of domestication. In dealing with the subject at its present stage, it will be useful to retain this distinction, which also, as a matter of fact, corresponds clearly with the entomological classification of silkworms into their two main classes *Bombycidæ* and *Saturniidæ*.

It is claimed by Sir T. Wardle, in his "Handbook of Indian Wild Silks in the South Kensington Museum," that the "wild" silks of India may, with the aid of enterprise and capital, yield to systematic collection and cultivation a result as profitable as that which has attended the scientific culture of tea and cinchona. It has more than once been contended that the climatic conditions of this country are far more favourable to the development of the industry in "wild" silks than of that in the produce of the mulberry-feeding worm. The subject, therefore, is one of considerable importance, and claims a prominent place in any treatise dealing with the potential resources of an Indian Province. It would appear from the "Dictionary of the Economic Products of India" that there are in all thirty-one species of *Saturniidæ* or wild silkworms found in India. It is admitted, however, even by those who may not unfairly be described as the professed champions of the "wild" silkworm, that only three of these species have so far been proved to be of any economic value: viz., the *Antheræa paphia* (Hindi, *tusuru*), which yields the tasar silk of commerce, the *Attacus ricini*, or castor-oil silkworm which yields the silk known as "*eri*," and the *Antheræa Assam* or *múga* worm which produces the silk known as "*múga*." Neither of these three silkworms is at all common in the Punjab. Although the Province is shown by Sir Thomas Wardle as one of the places where the *tasar* moth is common, yet the *Antheræa paphia* or *tasar* moth proper is, says Dr. Watt, "practically absent from the Punjab," and the moth known as the *tasar* in the Province is not the true *Antheræa paphia*. The *eri* silkworm is not found at all, and though one authority includes Kángra in his list of the districts where the *múga* worm is found, it would not seem that this is correct. It is, indeed, probable that it is not found further west than Dehra Dún. While, however, the Punjab is thus entirely deficient in the "wild" silkworms which are commonly recognised as those of chief economic value, there are a certain number of *Saturniidæ* found in the Province, some of which are capable of yielding silk. These are altogether eight in number, viz., the *Actias Selene* (Simla), the *Antheræa Roylei* (Simla), the *Antheræa Sivalika* (mainly in Hoshiárpur), *Attacus Canningi* (Murree), the *Attacus Cynthia* (Simla and Kángra), the *Caligula Simla* (Simla), the *Rinaca Zuleika* (Simla), and *Saturnia Grotei* (Kulu). It will be seen that these silkworms are found, with one exception, in the Upper Himalayas.

Under the head of mulberry-feeding, or domesticated silkworms is included the second of the two families of silkworms, namely, that known to entomologists as *Bombycidæ*. Those commonly cultivated in Japan, Central Asia and Southern Europe differ from those cultivated in India, in the fact that they flourish in a temperate climate, require cold for the hatching of eggs, and are "univoltine" (*i.e.*, produce one crop in the course of the year); while those commonly cultivated in India are multivoltine, thrive in moist, sub-tropical climates, and do not require cold for the hatching of their eggs. The latter variety, though giving several crops in a year, of a quality not altogether inferior to the Chino-European species, nevertheless produce silk so loosely wound on the cocoon that it is difficult in reeling it off to avoid entanglement. For this reason various attempts have been made to rear in the more temperate parts of India *Bombycidæ* of the variety cultivated in Europe, China and Japan. Next to Kashmír, certain districts of the Punjab have formed the chief scene of these experiments. It is this fact which gives, for the present purpose, the chief interest to the study of mulberry-feeding silkworms.

There are altogether some seventeen varieties of *Bombycidæ* found in India. Only three of these species have been found wild in the Punjab, viz., *Ocinaria lactea*, *O. Moorei* (both found in Kulu, but neither of any value), and the *Theophila Huttoni*, found in Simla by Captain Hutton in 1837, but which proved to have no practical value. Of imported worms two, the *Bombyx Croesi* and the *Bombyx mori* (the Chinese mulberry silkworm cultivated in Japan, Central Asia and Southern Europe), have been at various times domesticated in the Punjab. The former is a multivoltine silkworm originally introduced from China, of a far less valuable type than the latter, which is a univoltine species commonly accepted in Europe as yielding by far the most valuable results to systematic cultivation. It is in connection with the domestication of this variety that the most consistent efforts have been made in the Punjab.

"Wild" Silks.—The value of the produce of the "wild" silkworm has been recognised almost from the beginning of the British occupation of India, and it is not surprising to find that the history of the attempts to systematically utilize the worm in the Punjab dates soon after the annexation. In 1858 the Financial Commissioner issued a circular letter stating that a method had lately been discovered by which the fibre of the tasar (*A. Sivalika*, not the *A. paphia*) could be detached from the cocoon and adapted for the loom without unwinding it. "As a consequence, certain parties in Calcutta have taken up the matter; and are anxious to obtain the cocoons of the above worm in any quantities that may be obtainable." An English merchant at Harriki was prepared to purchase them at Kálka, at Rs.4-8 a maund. Writing in the same year to the Chief Commissioner, the Financial Commissioner (Sir D. Macleod) expressed his opinion that the tasar could "by judicious arrangements" be reared to any extent and rendered highly remunerative. The natives were, he says, entirely ignorant that silk could be produced from the cocoon, "to which alone I believe it is owing, that the only use they have hitherto made of the cocoon is to cut it into strips as a binding material for the stocks of their matchlocks."

Sir Donald Macleod then goes on to suggest that worms should be hatched out from the eggs of the moth and applied to the trees, and the cocoons gathered and removed. Experiments in this direction do not, however,

seem to have been made until 1884, when Mr. Coldstream, C.S., then Deputy Commissioner of Hoshiárpur, attempted to domesticate the *A. Sivalika*, more or less on the above lines. He utilized the agency of zaildárs and lambardárs to collect the cocoons, which he kept in bamboo cages until they were ready to burst. This took place in June or July, at the beginning of the rains. The eggs obtained from the female moths were hatched out in open baskets, and the young worms were, when a few days old, placed out in the open on *beri* trees. An attempt to feed them by hand ended in failure. The *beri* seems to have proved to be excellently suited for the purpose, as after being denuded of its leaves in the rainy season, it will, in a few days, send forth an abundant supply of fresh leaves. The *sawani* was also tried, though with less success than in the case of the *beri*; experiments with other trees failed. At the same time, it does not appear that any very complete measure of success attended Mr. Coldstream's attempt to cultivate the worm. In hardly a single instance did he manage to increase the original stock; in some cases he even finished with fewer cocoons than he had started with. But he found no difficulty in reeling off the silk from the cocoon.

Up to the present, it cannot be said that we have clear evidence that the Punjab can produce tasar silk. The problem is, in the first place, to increase the number of collected cocoons by judicious hatching out of the eggs and by "planting out" the young grubs on properly situated groves of *beri*. Unless this can be done on any considerable scale, there is *primâ facie* but small chance of success. The spinner employed by Mr. Coldstream could only earn five annas a day *when supplied with his cocoons free of charge*. There is, however, another direction in which the *A. Sivalika* might with advantage be exploited. One great objection to the development of the Indian tasar silk industry is the imperfect and faulty system of Indian reeling. This fact is at once established by the published figures of the tasar reeled fibre, the Italian or improved fibre yielding three or four times the price of the ordinary native reeled silk. The ease with which Mr. Coldstream's silk was reeled may perhaps be accepted as an indication that the *A. Sivalika* would yield good results under the improved reeling process, and it would be at all events interesting to ascertain whether this were or not the fact.

THE MULBERRY-FED WORM.—If the attempts to exploit the wild silkworm have been somewhat meagre, the same cannot be said of the efforts made to domesticate the mulberry-fed species. There is no mulberry-fed silkworm of any value naturally indigenous to the Punjab. Two facts have, however, encouraged the hope that the Province would prove to be the best breeding ground for imported *Bombycidæ*. In the first place, mulberries flourish freely in many districts. In the second, the more favoured parts of the Province combine a temperate summer climate with a cold winter, and this fact from the first inspired a belief that the Punjab would afford unusually good opportunities for domesticating the *Bombyx mori*, the best and most valuable type of the mulberry-fed moths, which requires a cold climate for the hatching of its eggs, and has, on that account, received most attention in Europe.

The exact amount of silk rearing now carried on in the Punjab is very small. The Census Report of 1891 does not give the numbers of silk-growers. The reports received from District Officers during 1898-99 show that there are now only two districts, Kohát and Gurdáspur, in which the moth is cultivated at all. The Deputy Commissioner, Kohát, states that about twenty men cultivate silkworms at Dallan, a village situate at the western end of the Darrah Valley (Teri Tahsil) on the Waziri border. They obtain their eggs from the Kurram Valley. At present the chief place of cultivation in Gurdáspur is Behrámpur.

MANUFACTURE—EXTENT.—While sericulture, therefore, cannot be said to exist as an industry in the Punjab, there is, on the other hand, a manufacture of some importance carried on in the Province. While the net import of raw silk has increased during the last ten years, it is noticeable that the imports from Bokhára and Kábul have largely fallen off. This is, no doubt, mainly due to the high export duties imposed by the Amír, and is part of the general decline in the trade of Afghánistán with British India. It is possible that the small increase in imports *viâ* Ladákh observable in recent years may be due to the fact that the Central Asian silk now reaches India in preference by the Karakoram route, and no doubt a certain part of the Bokhára silk also reaches India by the Persian Gulf and Bombay. But these remarks do not by any means exhaust all the facts of the case. The decline in imports from Bokhára and Kábul has been accompanied by a decline in the import of Indian raw silk from Bengal. The Punjab manufacturer has no doubt begun to appreciate the fact that the China and Japan silk imported from Bombay takes colour far better, and is easier to work, than either the Central Asian or the Bengal variety.

Next to Burma, the Punjab was, in 1891, the Province which used the largest quantity of raw silk for the purpose of manufacture. Since that date, however, the relative position of the Punjab would seem to have declined, owing to the competition of the Bombay and Calcutta mills. At the same time it is obvious that the quantity of raw silk used in the Province has shown of recent years a tendency to increase rather than decrease, and it is not possible to endorse the opinion expressed in the majority of the District Reports that the manufacturing industry is rapidly declining owing to European competition. The net import of the raw material is very nearly 6 lakhs of pounds. The provincial valuation of Indian silk piece-goods is given in the Internal Trade Report at about Rs.7 per lb. On this showing the total value of the manufactured product should be at least 40 lakhs.

CENTRES OF MANUFACTURE.—It must be premised that there are four distinct operations included in the term manufacture (viz., reeling from the cocoon, preparation for the loom, dyeing, and weaving or embroidering), and that there are but few places in which all four operations are carried on. Probably Amritsar is the only place in the Province in which much reeling is done, as the amount of silk produced and reeled at Dallan (Kohát) and in Gurdáspur District must be very small. Silk is prepared for the loom at Pesháwar, Kohát, Jullundur, Amritsar, Lahore, Mooltan, and Delhi. It is dyed in the same places, and in addition at Siálkot, Shahpur, Dera Gházi Khan, Jhang, and Rohtak. The silk, prepared and dyed, is woven in some form or other in most districts of the Province, with a few exceptions. It is probably used for embroidery in every district of the Punjab.

PROCESSES OF MANUFACTURE.—Reeling from the cocoon: The cocoons (*kaunta*) are dipped in boiling water and battered about till the gum has all softened. The threads are then collected by means of a birch brush, and the number needed for the required deniers are crossed together and placed on the hank reel, which is then put in motion and the silk wound off on to it. In native use thick thread is far more popular than the finer counts, and a good many strands are usually reeled together. No improved method of reeling seems to have been introduced in the Punjab, though several Kashmíris living at Sujánpur are said to have acquired great manual dexterity in using the above method, owing to their employment under European supervision at Messrs. Lister's filature. The best men will reel from 4 to 5 chittáks of silk daily, using for this purpose 16 chittáks of foreign cocoons or 20 chittáks of country cocoons. Scarcely any silk reeling is now done in the Punjab. Such men as are employed on this work in the Gurdáspur District receive Re. 1 a sér of silk and their food.

Preparation of thread for the dyer: Raw silk imported from Central Asia, China, or Bengal is seldom fit for use until it has been rewound and properly cleaned. With the exception of the *sikka* (Singapuri), *gungru* (Bengali), and *kattar* (Bengali) varieties of silk, all imported silks are sent to the *patphera* or winder before they can be consigned to the dyer. The method of winding the silk is briefly as follows:—The *patphera* first opens the skein and puts one end on the *charkha* which is fixed on a wall some feet from the ground; the other end is passed over the *uri* or *dhaniri*, which is movable, and is placed so that the skein is stretched tight. If the silk be of good quality and easily reeled, he picks out the thread with one hand and transfers it to a small spindle or pinion, which he holds in the other hand. If the silk be much tangled and needs careful winding, he takes the *tabeel* or *tahvil*, which is fitted with a small handle, and winds the silk on to it. The object is to disentangle and equalize the threads, which, when broken, are deftly mended with the tongue. He then unwinds the silk from the *tabeel* on to a spindle (*úras*) which he holds in his hand. Each skein contains several qualities of silk, and he transfers each quality to a separate *úras*. The silk intended for the *táni* or warp is then taken in hand separately by the *patphera* or sometimes by a different man, the *tanzi* or *tewdi*. The thread is too slender for working, and two or three threads are "thrown" together. The method discovered by the Italians, and long kept secret by them, until stolen by John Lombe of Derby, gives the thread a double twist. The Indian method only gives it a single twist, and no improvement seems to have been made in this respect. At Jullundur, however, a machine worked by a wheel is in use, which works from 20 to 30 *charkhás* at the same time and thus twists a number of *tánís* by the same operation.

Dyeing: The silk is now ready for the dyer. With a very few exceptions, all silk when imported is of a white or yellow colour. Dyeing is carried out either by a special silk dyer (*patrang*) or by the ordinary *rangrez*. The silk seems to be invariably cleaned by boiling in a solution of *chúna* (lime), *sajji* (carbonate of soda) and water. To this sweet oil is sometimes added. No substitute seems to have been found as yet for this somewhat strong detergent, which is, however, undoubtedly effectual, though silk loses weight heavily after immersion in it. After being washed in cold water, the silk is boiled or steeped in a solution of alum in order to prepare it to receive the colour. Aniline dyes have to a great extent superseded the indigenous dyes, being cheaper, easier and quicker to work, and give a better gloss. At Amritsar a good deal of use seems to be made still of country dyes, and they are said to be used regularly at Dera Gházi Khan. Indigo is still used for all combinations of blue. The colours mainly used at present seem to be—*Sabz*, green; *zard*, yellow; *gulnár*, scarlet; *golabi*, pink; *surakh*, red; *krimchi*, crimson; *firozi*, blue; *asmáni*, light blue; *dháni*, pale yellow; *khatta*, yellow; *sharbati*, yellow; *fákhtai*, dark grey; *safed*, white; *siah sabz*, dark green; *bhura*, buff; *jogia*, salmon; *sandli*, brown; *badámi*, almond; *káfúri*, dull white; *narangi*, orange; *uda*, purple; *kásni*, mauve; *sunahri*, light tan.

WEAVING.—After the dyer has finished with the silk, it is handed back to the *patphera* to rewind. He does this by simply taking the silk and running the thread on his fingers, winding it into a skein. In cases where an additional gloss is required, the silk is rubbed with an iron pin. It is then sent to *juláhás* or *bandi pánewálás*, who, after dipping the thread into starch or gum, stretch it on the loom and give it to the weaver. The process of weaving, whether the object be to produce a pure silk fabric or a fabric of mixed silk and cotton, is exactly similar to that adopted in weaving cotton.

In making *azárbands* the process is rather netting or webbing than weaving. The prepared thread is first stretched tight on four pegs placed in a quadrilateral on the ground. It is then taken off on to two sticks, the top stick being fastened to the wall, and the lower held between the feet. The silk being thus stretched tight, the maker takes a number of bobbins of reed or *pamber* about a foot long, and places one crossways through the silk in such a way as to divide it into upper and lower strands. Then taking a strand between two fingers, he proceeds to twist the strands in and out from right to left, and on reaching the end of the row, places a bobbin beneath it. This operation is repeated till the whole is laced together, when the bobbins are withdrawn and the interlaced strands secured by a knot. The material formed is really a kind of lace in which the threads are twisted instead of knotted. Occasionally a *shísham* wood frame is used. The above method is also used in making hair nets and similar ornaments. The work is usually done at home by women in their leisure hours, but a considerable number of persons are employed on this work exclusively at Amritsar and Mooltan, on wages varying from 3 annas to 8 annas a day.

In *patoli*-work (silk-braiding) the workmen use mainly the coarser kinds of silk for stringing jewels, but also use the better counts for ear ornaments and bracelets. Mrs. F. A. Steel speaks of their work as follows:—"These are to be found in every bazár, and a large quantity of silk must pass through their hands. They seem always busy, and I should put them next to the comb-makers in steady attention to business. . . . They are extremely ingenious and neat-fingered in making the various twists, knots, cords, plaits and tassels used in their trade. I have seen a cord for fastening the silver ornaments in a bride's hair which in variety of knots equalled any halyard. Necklets, amulets and wristlets are all mounted by the *patoli* on silk with a greater or lesser admixture of tinsel. The quantity of silk used in an ordinary *nani* such as is worn by most women is about 4 annas worth, and it will last a year or perhaps longer. The *patoli* also makes *dagi* or ear-ring suspenders, to be worn when the ear holes

have been torn through. The better kinds of these are very expensive, as much as two rupees being sometimes given for a pair. He also knots and fringes the ends of bridal *azárbands*; indeed, his work is indispensable in women's dress. But it is during the months of Sáwan and Bhádon that the *patolís* work is in greatest request, and a considerable amount of silk must be used at these times. The *sáwani* or rain festival begins on the first Sunday in Sáwan, when the sweeper girls put on the silken ear-rings called "*phummans*" from the tufts or balls of floss silk employed in their manufacture (Anglicè, *pompoms*). On the second Sunday the Musalmán girls follow suit, and on the third the Hindús. As there is a good deal of emulation as to which festival shall be the smartest, the number of these ear-rings worn by each girl is considerable. They cost about a pice a pair, and are made of *phummans* of seven different colours, one for each day of the festival week. The custom is universal in the Punjab, and the ear-rings worn by the wealthier classes are very elaborate, costing as much as four annas a set. On the first of Bhádon again, every Hindu wears a wristlet of silk decorated with *pompoms* of various colours (*rakri*). The *patolis'* price for these averages one pice, but the Brahmans who go round to their constituents and put them on, receive fees in proportion to the wealth of the family. These wristlets are worn in commemoration of Rám Chandar's departure from his father's house to rescue Sita from her enemies, and are supposed to preserve the wearer from harm during the year."

Articles produced.—Silken manufactured articles produced in the Punjab may be divided into three classes: (*a*) woven fabrics of pure silk; (*b*) woven fabrics of silk and cotton; and (*c*) netted fabrics of silk or silk and cotton. It should be noticed here that it is unlawful for Musalmáns to wear pure silk fabrics, and this no doubt accounts for the large manufacture of silk and cotton goods (called generally *mashru* or "permitted") in the western half of the Province.

Embroidery.—Wearing cloth of every kind is embroidered. The work may be said to fall into two classes. First, there is the ornamentation of caps, table centres, &c. (which forms the chief part of the Delhi industry), *phulkáris*, *bághs*, and *chogás*. Secondly, there is the work (*bel bunta*) done by women on garments for their own wear. *Phulkáris* and *bághs* are known by a great variety of names according to the colour and pattern of embroidery used. There is, for instance, the *dabla* (yellow silk), *akhor* (yellow, green and white), and many others. The slightest difference in pattern seems to warrant a change in nomenclature. The *búnd* is worn as a covering by a bride on the first day of her marriage; the *sirga* is given by the bride's relations to the elderly persons present at the marriage.

Use of Silk Fabrics.—There is a general belief that the silk industry of the Province is falling off, that less raw silk is imported and less manufactured, fewer hands employed, and the reason of this decline is said to be the diminished demand for silken clothes. "European cotton goods, printed calicoes, and cheap broadcloths have turned silken garments out of the field. Even for purposes of embroidery, cotton thread, dyed bright colours, is said to be supplanting silk." This is, no doubt, true. The use of silk for wearing apparel is said to have been common in Sikh times: the use of pure silk is certainly not common now. Even the embroidery of *phulkáris* for domestic use seems to be no longer so popular as formerly. "The women," says Mrs. Steel, "themselves admit their preference for the gaudy imitations of Manchester. Of course, a real *phulkári* or *bágh*, according to the wealth of the house, must be worn by every bride during the *phera* ceremony of marriage, and a certain number of embroideries will always be found in the trousseau; but these become more and more for show, and do duty in many outfits."

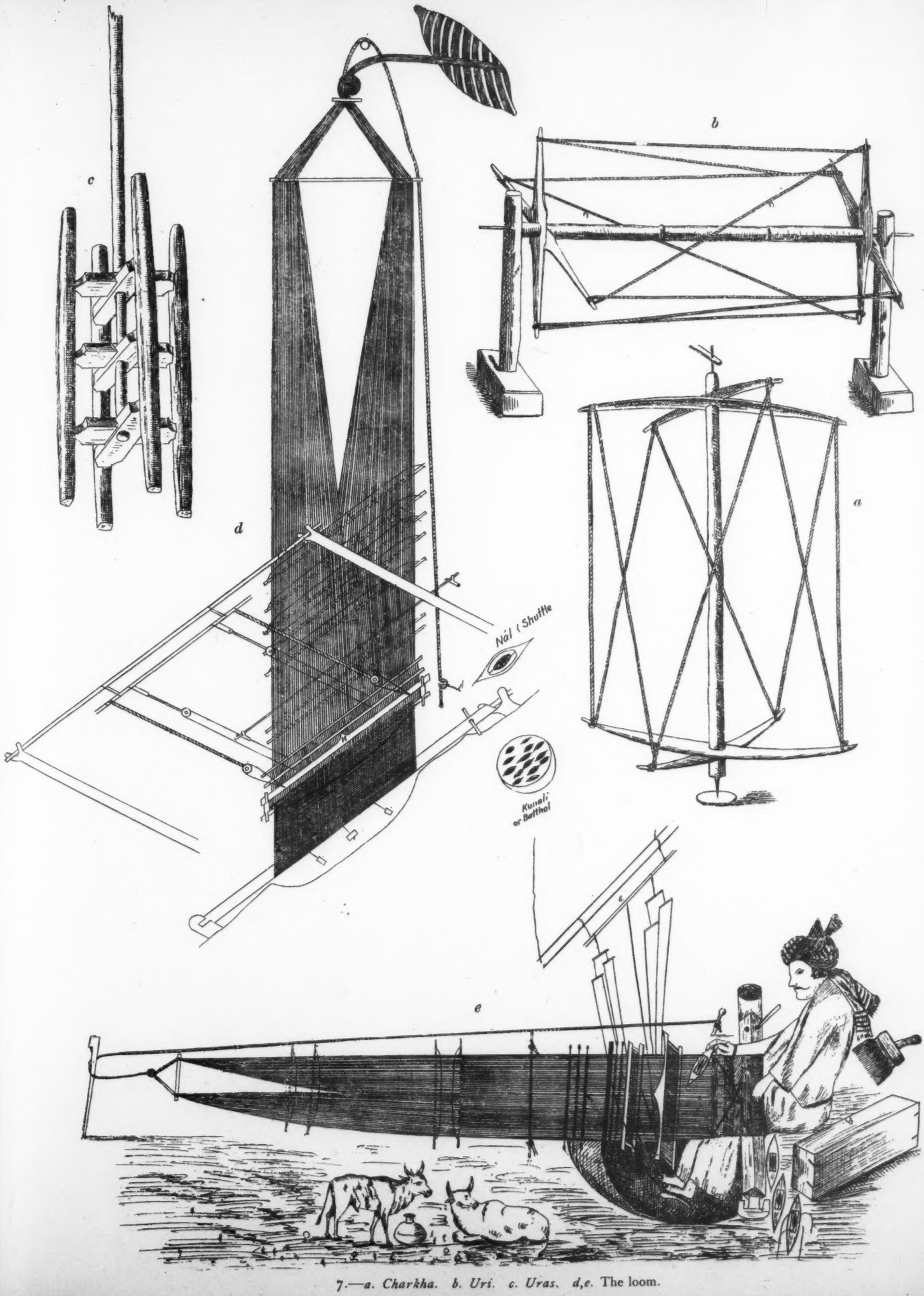
To statements such as these quoted above, however, there are certain qualifications. Pure silk *dupattas*, *langhás* or *shalwárs* of *daryai*, *gulbadan* or *kanawez* are doubtless worn far less than before. But there is a strong and perhaps growing demand for mixed cotton and silk goods. *Lungi*, *súsi*, *garbhi* and other mixed silk fabrics are largely manufactured and very generally worn. Nor must it be forgotten that the use of mixed fabrics appeals to a far wider class than could indulge in the use of pure silk goods. The complaint that people prefer quantity to quality, mixtures of cheaper materials to the more lasting (but more expensive) pure fabrics, is not confined to India alone. The change is inevitable, and is a necessary accompaniment of the more general diffusion of wealth, the raising of the standard of comfort among the poorer classes of the community. We can, perhaps, afford to disregard the somewhat sentimental complaints contained in various district reports as to the decline in the use of pure silk fabrics. If the soldier of the Khálsa no longer swaggers into the fight with his turban of *daryai*, if the bride no longer sends her father to the *banya* in order that she may appear with a fitting trousseau of Bokháran silks, it is hardly a cause for regret. It is better that fifty people should be moderately comfortable than that one should be magnificent. That silk is still used, and largely used, in the Province the figures given in preceding paragraphs will prove.

LIST OF ILLUSTRATIONS.

Silk Fabrics of the Bombay Presidency.—1. Winding and Spinning Silk. 2. Doubling and Warping. 3. Part of Heddle; part of *Phani* or Comb; the Shuttle; and Weaving in an upper storey.

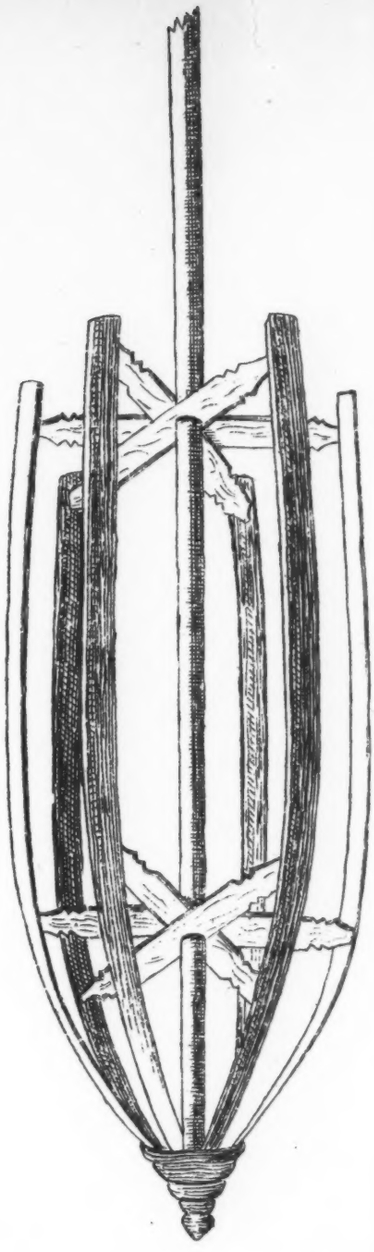
Silk Fabrics of the Central Provinces.—4. Woman reeling tasar cocoons; the *asari*, *chhati*, and *jantur*. 5. The laying of the Warp; the Loom. 6. Spinning Implements.

Silk Industry in the Punjab.—7. *Charkha*, &c.; the Loom. 8, 9. Spinning Implements, &c.



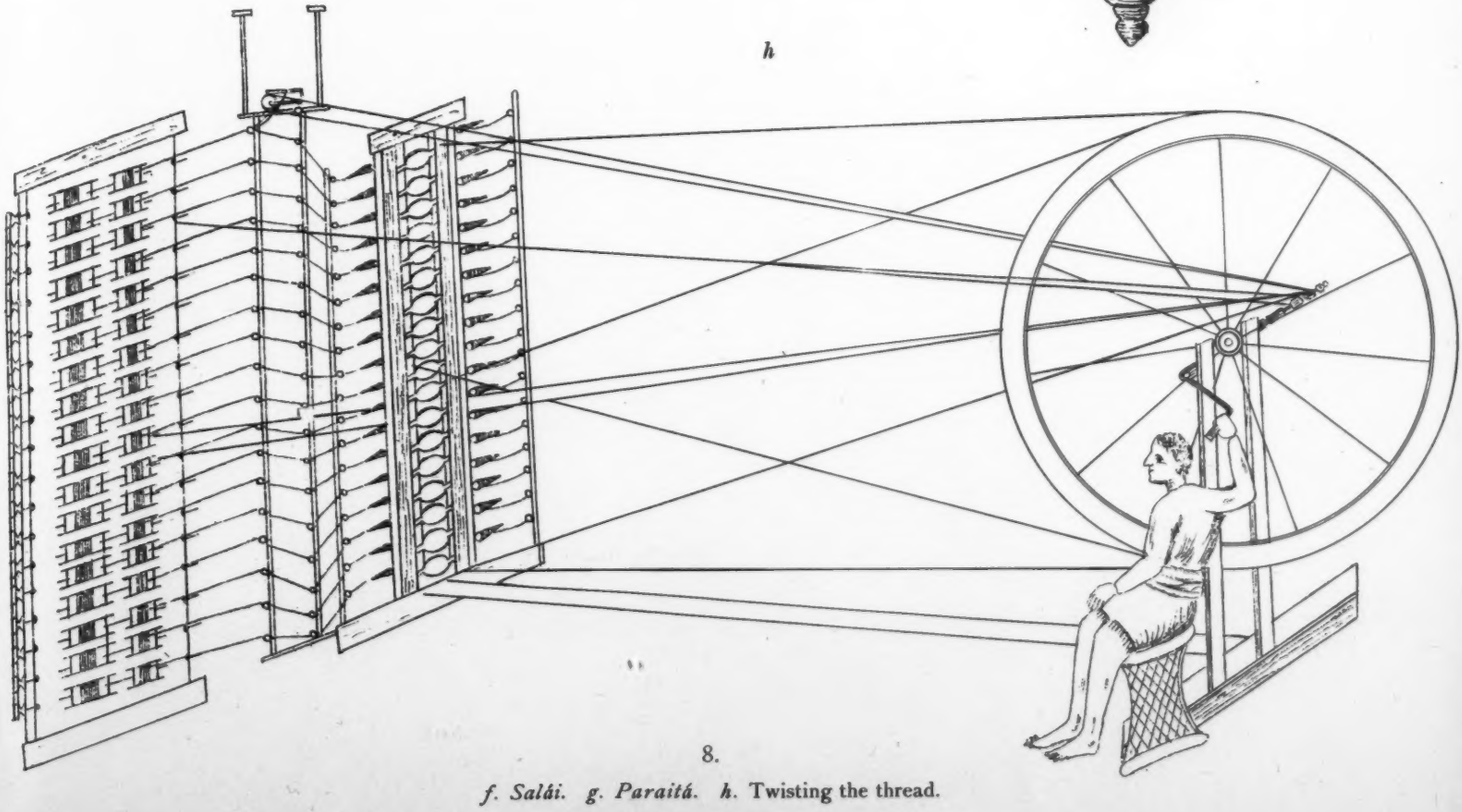
7.—*a. Charkha. b. Uri. c. Uras. d,e.* The loom.

f



g

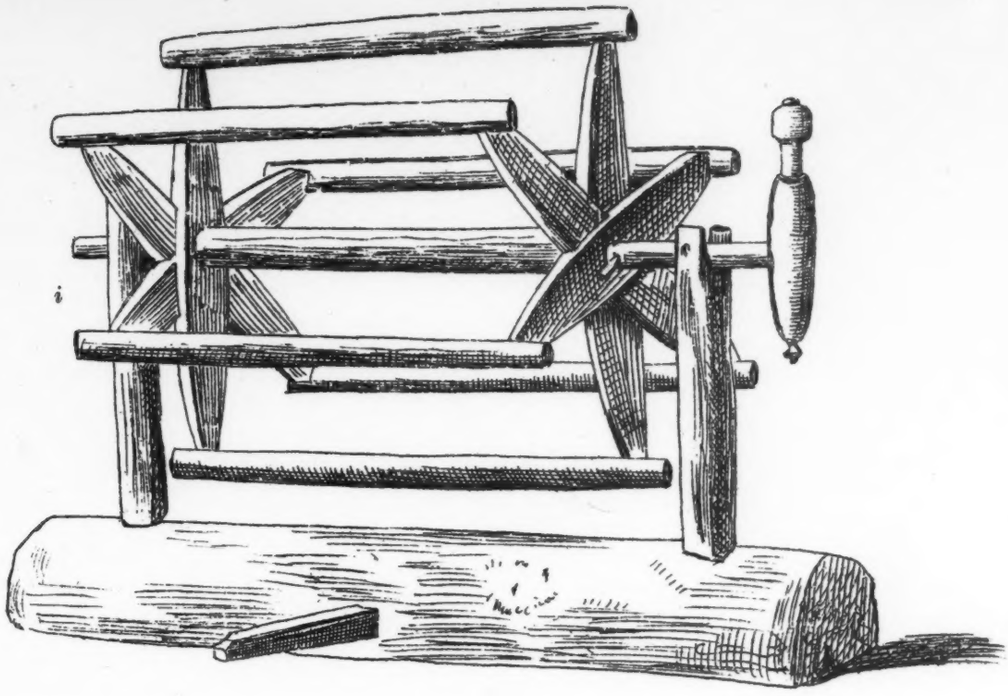
h



8.

f. Salâi. g. Paraitá. h. Twisting the thread.

(*Silk Industry in the Punjab*).



9.

i. Tabeel. j. Making *azárbands.*

(*Silk Industry in the Punjab*).

The Journal of Indian Art and Industry.

WOOLLEN FABRICS OF THE BOMBAY PRESIDENCY.

By B. A. BRENDON, Esq., I.C.S.

The woollen industry in this Presidency, in so far as native enterprise is concerned, is confined to the manufacture of blankets, carpets, rugs, felt and sacking. Blanket-weaving is carried on to a greater or less extent in every district except Kánara, and felt-making is also equally well distributed. Carpets are made at a few factories in and near Ahmedabad and at one place (Bubak) in the Karáchi district in Sind. Rugs and sacking are made exclusively in Sind, where the industry exists in every district.

There is no good class of wool grown in the Presidency. The staple is generally coarse and short and the fleece full of hairs, technically known as "kemps," which will not "felt," and which protrude from the surface of the fabric when woven. Felting, or milling as it is also called, is a technical name for a process which is commonly known as shrinking, and is that process by which the threads in a fabric are so closely drawn together that they are practically indistinguishable from one another. Hair, unlike wool, will not shrink, nor has any machinery been yet invented for the separation of these kemps from the wool fibres. In a coarse blanket the presence of hair is an advantage, but in a cloth it is a great defect, and though it cannot be avoided in working with Indian wool, the appearance of hair is removed by passing the cloth under an extremely sharp knife, which shaves off all the projecting hairs. In the case of Cashmere wool, which has a very fine staple, kemps are removed to a certain extent by hand: a tedious, costly and at best inefficient method, for a large number of hairs are certain to remain with the wool.

The first process through which the raw wool has to pass, after being sorted, is cleaning. This is generally performed by Mahomedan Pinjáris using the bow (*kamán*). The term used does not express the nature of the operation as well as might be wished, though it is hard to find a better. The purpose of the operation is somewhat analogous to that of "ginning" in the cotton industry and it corresponds to a very limited extent to that of "carding" in an English woollen mill. The application of either of these terms to the operation in question would be illegitimate. The instrument is suspended by a cord attached to the middle of the string of another bow of the ordinary kind, and this bow is fastened to a peg in the wall. By this means a certain amount of play is afforded to the instrument, which is so adjusted that the string of gut almost touches a heap of wool placed on the ground. The Pinjári then holding the instrument in his left hand, presses it down until the gut just touches the heap of wool, and at the same time he strikes the gut with a short wooden club shaped very much like a dumb-bell. The vibrating gut takes up a little of the wool and the instrument is allowed to rise clear of the heap; a second or third stroke of the club frees the gut of the clinging fibres, which are thrown to a short distance, separated from all the heavier impurities which fall back on the heap. The *kamán* deals effectively with the tangled fibres in a fleece, though it fails to remove all the burrs which proverbially cling to a sheep's back in great numbers. A Pinjári charges about one anna for cleaning a seer of wool.

One of the weaver's family, generally a woman or a boy, next proceeds to spin the wool into yarn. The spindle is turned by a cord passing over a roughly shaped driving-wheel, which is turned by hand. The spinner takes in his left hand a quantity of raw wool, which he connects with the point of the spindle by a short length of yarn previously spun or roughly twisted in his hands for the purpose. Then, as he begins to turn the wheel, he slowly withdraws the handful of wool away from the spindle as far as he conveniently can. There is now a length of perhaps two feet of quivering twisting yarn between the spinner's hand and the point of the spindle. As soon as this is sufficiently spun, the operator's arm relaxes and the yarn is allowed to coil itself on the still turning spindle. Then the hand containing the unspun wool is again withdrawn and the operation recommences.

The yarn has next to be warped. The first thing to be done is to measure off the requisite number of threads or "ends," each of the proper length, which will be slightly greater than the length of fabric to be woven. The instrument consists of seven upright pegs fixed in a wooden base. There are two parallel rows of three pegs each, and there is one peg between these rows. The warper, sitting beside the instrument, passes one end of the yarn through a piece of hollow cane, and makes the end fast to one of the end pegs. The object of the hollow cane is to enable the warper to reach all the pegs without moving. Calling the peg to which the yarn is tied No. 1, the other peg at the same end No. 7, the two middle pegs Nos. 2 and 6 respectively, the two at the further end Nos. 3 and 5, and the centre peg No. 4, then the yarn is passed round outside the pegs in their numerical order as far as No. 7, when, instead of being carried on to No. 1, it is brought back in the reverse direction, with this difference, that instead of passing outside all the pegs, it is now passed inside the two middle pegs No. 2 and 6. At each of these two points, therefore, the yarn crosses and recrosses, forming a loop, technically called a lease. The distance round the pegs and back again is the length of the warp.

The next step is to remove the yarn. This would be a tedious process and would certainly result in destroying the order of the threads, if not in breaking some of them, if it were attempted while the yarn was stretched. The centre peg No. 4 is, therefore, pulled out, and the slackened threads are then easily removed; the leases being preserved by previously inserting a piece of cord through each of the loops formed at the middle pegs Nos. 2 and 6 and tying the threads together. Through the loops at each end of the threads a bamboo rod is now inserted, of sufficient length to admit of the threads being arranged on it according to the number required per inch of width of fabric. One of these rods is then secured to two pegs in the ground and the other is fastened by a rope passing over a trestle to another peg in the ground or wall. By raising the trestle into a vertical position, the warp threads are stretched tight, and they are then arranged at their proper distances from each other.

The warp is now ready for sizing. The sizing paste is generally made of crushed tamarind seeds boiled in water, though in some places, probably where tamarind seeds are not to be had, a paste made of *kodri* or *ragi* flour is used. After being sized and allowed to dry, the warp is taken as it is to the loom. The thin rod is fastened to the weaver's beam and the stout rod becomes the back beam of the loom. But before this is done the reed has to be placed in position. For this purpose the warp is slipped off one of the rods and the threads drawn through the divisions of the reed, which is hanging from a beam in the roof, and the rod is then passed through the loops and fastened in position. The next step is to affix the healds, one set of which is attached to the upper threads and the other to the lower threads. The healds are suspended as shown in the illustration, and are worked by treadles underneath. As one set of healds is depressed, the other set is automatically raised by the bar from which both are suspended, so that the original upper and lower threads alternately change places. After every cast of the shuttle, the weft is beaten home with the reed and the healds reversed. The shuttle is generally a bobbin fixed in a piece of split cane, of which both ends are closed, or in a piece of buffalo horn; but sometimes is simply a short length of hollow cane, of which one end is open, and in which the woollen yarn is placed in a ball at the bottom. The weft yarn is not sized at all in most places, the only reported exception to this rule being Ratnágiri, where it is said that the weft yarn is dipped into the ordinary tamarind seed paste and used while still wet in order that the threads may lie closer to each other. In other places the weft yarn is used after being damped in water or more generally quite dry. As the weaving proceeds the weaver from time to time slackens the rope by which the back beam is held in position and winds the woven portion on the weaver's beam; after which the warp is again tightened by the rope fixed to the back beam.

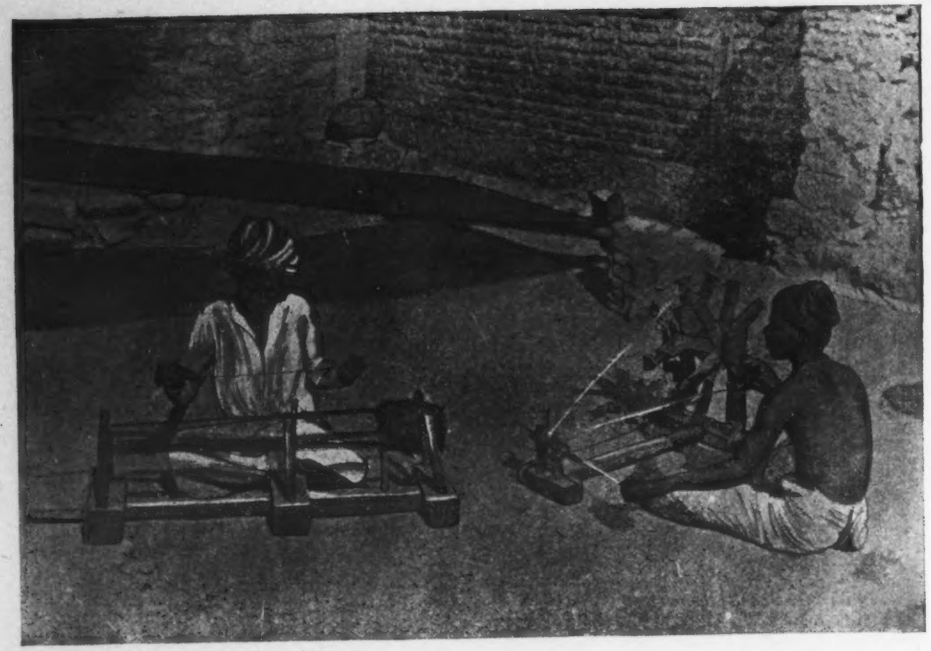
Carpets and Rugs.—Woollen pile carpets are made in the prisons at Yerowda, Thána, Ahmedabad, Karáchi, Hyderabad and Shikárpur; also in a few factories in and around Ahmedabad, and on a small scale at Bubak in the Karáchi district. A few are also turned out at the Sir J. J. School of Art in Bombay.

The method in all these places is much the same. The loom is a vertical frame consisting of two upright beams fixed in the ground 12 or 14 feet apart. Between these beams there is a pit 3 feet wide and of the same depth, in which the weavers sit or dispose of their legs when working at the commencement of the carpet. The upright beams are from 6 to 10 feet above the ground. Between them, at the top and bottom, are fixed two horizontal beams, which are capable of being turned by a lever, and between these beams the warp is stretched. The warp is generally cotton yarn of some coarse count, several strands being twisted together for the sake of strength. Cotton is simply used on account of its cheapness. The only place where a warp of woollen yarn is used is the Bombay School of Art. The warp yarn is first arranged on two upright pegs fixed in the ground about 3 feet further apart than the length of the carpet to be woven, to allow for contraction during weaving and wastage at both ends. The threads are laid on, to the number required for the width of the carpet, in such a manner as to cross each other midway between the pegs at each turn. At either extremity, on the outer edge of each peg, the threads are laced together to preserve their relative order. The requisite number of threads having been arranged on the pegs, one peg is removed to slacken the warp, which is then slipped off the other peg. Through the loops at either end of the threads a bamboo rod is inserted which is long enough to hold the warp, when the threads are arranged according to the requisite number per inch. The rods are then fastened to the upper and lower beams of the loom respectively and the warp tightened by being wound on the upper beam, which is turned by a lever.

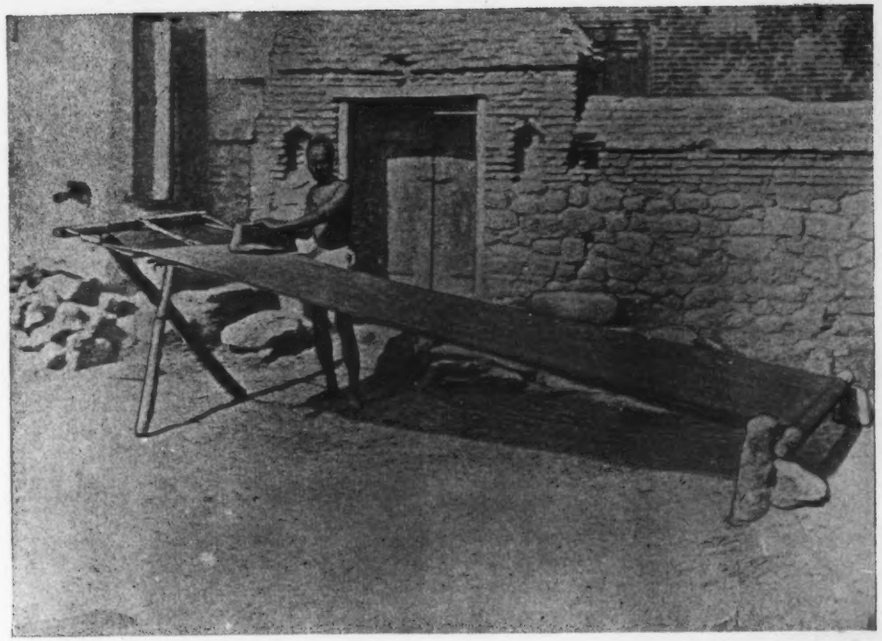
The next step is to attach the healds. These consist of two rods, one knitted by a series of loops to the back row of warp threads, and the other to the front row, both rods being connected in such a manner that the drawing forward of the one automatically relaxes the other. To maintain an equal tension upon the back and front rows of the warp during the repeated processes of reversing the heald, an ingenious device has been adopted. A rod, technically called a lease-rod, is inserted between the warp near the top beam of the loom. The heald is then reversed and another rod inserted in the new "shed" about 4 inches below the first. The warp threads cross each other midway between the rods. The lower lease-rod is prevented from slipping down by being secured at both ends to the upper lease-rod, which is held in position by the crossing of the threads below it. Everything is now ready for weaving. Usually one weaver is allotted to every 18 inches or 2 feet of width of carpet, and each weaver has a bundle of short lengths of woollen yarn of various colours hanging by him within easy reach. A prompter at the back of the loom reads out the pattern from a sample or diagram in front of him.

A few rows of the weft are first inserted by shuttle in the ordinary way with cotton yarn, in order that the warp threads shall not lose their relative distances. Each weaver, as his portion of the pattern is called out, taking a piece of woollen yarn of the right colour, passes an end of it between two strands of the front row of warp threads, carries it round the corresponding back thread on the right, brings it forward and again passes it in between the two front threads first mentioned, carries it round the corresponding back thread on the left and then forward once more, pulling the two ends downwards until the tie rests on the row below. These ends are then cut off with a knife about an inch from the web. As each row of such ties is completed, two or three weft threads of cotton or woollen yarn are woven in, forming the basis of the fabric and at the same time binding the pile. As explained above, cotton yarn is used in the warp and weft simply for the sake of economy. When the warp is of wool or silk, the binding weft threads are of wool, and such carpets are much more durable than those made with a common warp. From time to time the pile is clipped over with a pair of scissors to form an even surface, and the portion thus clipped is wound on the lower beam, the warp wrapped on the upper beam being unrolled to a corresponding extent. The pile, which varies from 3-16ths to 3-8ths of an inch in depth, completely hides the cotton or woollen threads, both in the warp and weft.

Pinjari cleaning wool with bow.

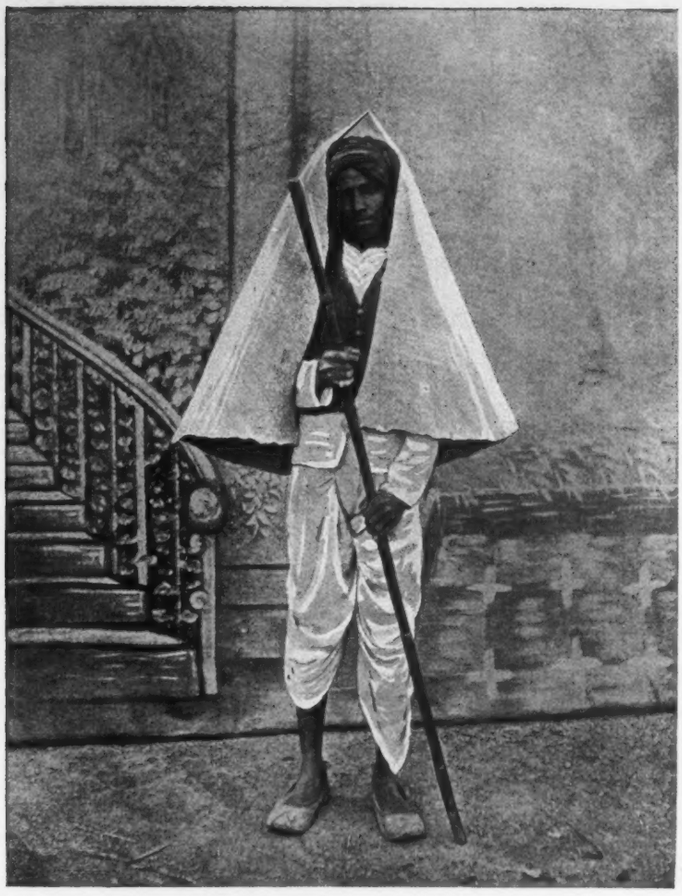


Measuring threads for the warp and spinning woollen yarn.

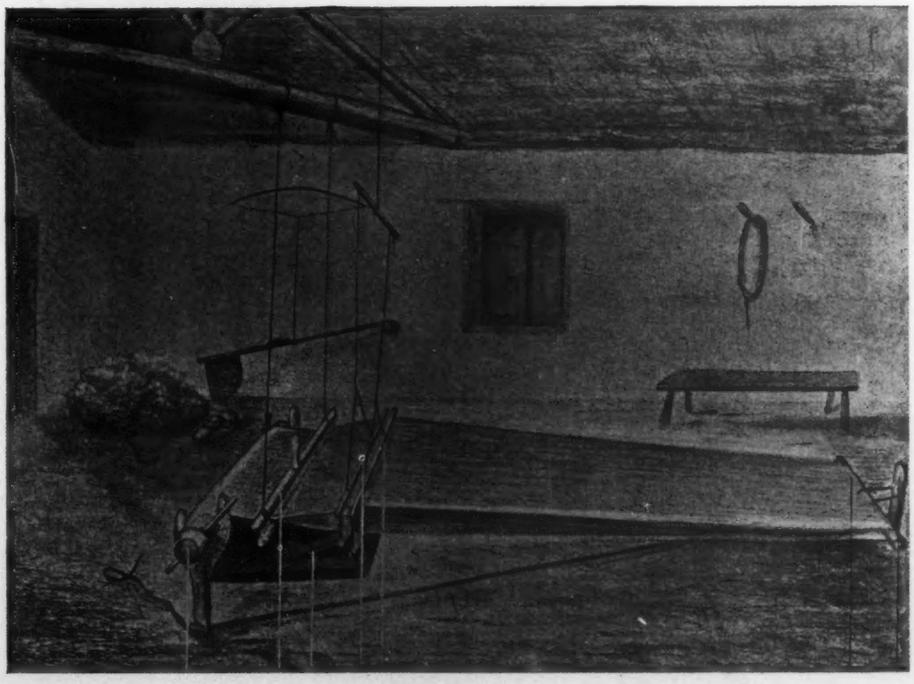


Sizing the warp.

10.—Woollen Fabrics of the Bombay Presidency.



Broach peasant wearing "Ghumti."



Woollen hand loom.

11.—Woollen Fabrics of the Bombay Presidency.

COTTON FABRICS OF THE BOMBAY PRESIDENCY.

By R. E. ENTHOVEN, Esq., I.C.S.

The production of cotton fabrics in Western India is of three descriptions. Firstly there is the outturn of the weaving mills and hosiery factories, of which the greater number are situated in Bombay Island. Next in importance is the work of the hand-weavers residing in all districts of Bombay, including Sind, with the exception of the Panch Mahâls. Thirdly, the majority of the jails produce hand-woven fabrics mostly superior in texture to similar cloths from the hand-looms of voluntary labourers. Several classes of fabrics are produced in the jails alone. Broadly speaking, the yarn in all cases is machine-made, the coarser counts being from the mills of the Presidency, and the finer counts imported from England. Hand-spinning is not extinct, but it is seldom relied on by professional hand-weavers for the supply of their raw material.

It is not possible to form any approximate estimate of the annual outturn from these three sources. The number of persons employed and their immediate dependents is probably about 750,000. The mills of the Western Presidency are three times more numerous than those in other parts of India, and supply a very much larger area than Bombay. To a certain extent also the hand-looms contribute to markets more distant than those of the neighbouring districts. Thus, there is an export from Bombay of hand-woven cloths to Muscat, the Arabian ports, and the East Coast of Africa.

Hand-Woven Cloths and the methods of weaving them.—Among the products of the hand-loom the *sari* stands first, being the most common and the most varied in texture, colour and design. The Indian *sari* is generally of an artistic tint, the result of judicious blending of colours in warp and weft. Red, green and blue are the most common colours. The borders of the cheaper *saris* do not vary much in design; but in the case of the better class goods made with silk borders there is a wider range of border patterns of delicate finish. The ends of all *saris* are generally of broad bands of colour which harmonize well with the rest of the garment. As a result, the *sari* becomes one of the most picturesque forms of apparel, and it is as gracefully worn as it is pleasing to the eye. After the *sari*, *cholis*, *pagaris*, *dhotars*, and coarse *dangari* may be said to form the backbone of the hand-weaving industry. *Cholis* are similar to the *saris* in colour and design. *Pagaris* are most frequently white or grey, but every shade is to be found, the order of the colours being red, yellow, green, blue and purple. They are worn in an endless variety of fashions—furnishing as a rule an indication of the caste or rank of the wearer. *Dhotars* have to compete with severe competition from the mills, and it is somewhat curious to find that they are still produced throughout so large a portion of the Presidency. Apparently there are many who continue to show their preference for the hand-woven *dhotar*, stronger and softer than the other. Probably its durability and the absence of the larger percentage of sizing with which the mill-made article is provided are the main reasons of the popularity of the hand-woven *dhotar*.

The common cloth, known as *dangari*, *khâdi*, *jori* and *pasodi*, is made in every district where weaving is carried on to any considerable extent. Woven of the coarsest warp, occasionally home-spun, and with a weft of 20's or thereabouts, it is adapted only to rough use. When not bought for wrapping goods, it is sold only to the poorest classes for clothing and bed covers. Of the other kinds of cloth produced, it may be said that none are sufficiently in demand to give the industry any importance, were those already described to be no longer produced. The grey cloths from the looms are dyed and printed by hand, being thus adapted for use as bed sheets, floor cloths, &c.

The following description will convey an idea of the method of working up yarn into cloth in the Island of Bombay and in the neighbouring districts:—The Bombay weaver's loom is from 8 to 15 feet long by 42 inches broad. The weaver sits at one end with his feet in a pit about 2½ feet square. Immediately in front of him is a round beam which supports the warp and round which the fabric is rolled as it is woven. About a foot and a half in front of the beam is the reed or *phani* hung from the roof. Between the thin slips of the bamboo of the *phani* the warp threads are passed. This reed is set in a frame and forms the shuttle-beam, which, after the shuttle has passed, the weaver pulls back against the cloth beam to force home the threads of the weft. In the pit are the treadles or foot-boards. These in the case of plain cotton *sari*-weaving do not exceed two in number. In the case of silk-bordered *saris* they are four. The weaver generally keeps his left foot for the leftmost treadle and works the other with his right, raising and lowering the threads of the warp. The treadles are joined to the heddles by strings. The frames of the heddles are placed close behind the reed. The treadles generally correspond with the heddles in number. Over a loom with four heddles two cords, a foot or two long, hang from the roof. To the end of each cord is fastened one end of a cane or slender rod about 2 feet long which hangs vertically. To the lower end of the rod is tied a second cord about 6 inches long. The lower end of this cord is tied round the middle of a slip of bamboo about 6 inches long. From each end of this slip of bamboo, which lies at right angles with the cord, hangs another cord about 4 inches long. This cord holds by the middle a smaller slip of bamboo about 4 inches long. From each end of these small pieces of bamboo a cord 12 inches long passes, each of the four cords being fastened to the heddle frame about 4 inches inside of the edge of the warp. These cords move up and down with the motion given by the treadles. The heddle frame is filled with couples of loops of twine, interlaced, one fastened to the top and the other to the bottom of the heddle frame. Through the heddles all the threads of the warp pass, some through the upper and some through the lower loops. Some pass through a loop in the first heddle, while others pass between the loops of the first heddles and through loops in the other heddles also. The working of the treadle moves the heddle, and the heddle moves the threads of the warp which it governs, while between each movement of the warp threads the shuttle loaded with weft yarn is passed across the warp. Behind the heddles horizontal rods are thrust between the upper and the lower threads of the warp to keep them from entangling, and 10 or 12 feet further is the warping rod, round which the warp is wound. This rod, which is about 4 feet long and 2 inches thick, is tied to another rod known as the *turai*, kept tight by a rope passed round a post and brought back along the side of the loom, being finally fastened to a peg close to the

weaver's right. The weaver from time to time loosens the rope as the woven fabric is wound round the cloth beam. The shuttle is about 8 inches long and is made of buffalo horn. The bobbin holding the thread is fixed on one long pivot; in weaving, the shuttle is thrown by the hand through the shed of the warp alternately from one side to another. After it has passed one way the reed is brought up against the thread with a jerk, thus forming the woof.

Bombay weavers do not generally take the trouble to make their own yarn which can be obtained at easy prices from the mills. They can also obtain it of any colour they want, but in the rare cases when they want it coloured it is dyed before it is sized, either with German aniline dyes, or by steeping in the indigo vats of the local indigo dyers. The cotton yarn, first moistened by dipping it in water, is then thrown round the large reel. To reduce the size of the skein, it is wound from the large reel on to a middle-sized one. In re-winding the skein, the winder holds in his toes the end of the central rod of the larger reel and with his right hand draws off the yarn from the skein to wind it on a smaller reel which he holds in his left hand, whirling it in a smooth cocoanut cup. To reduce the skein to a convenient size, the yarn is wound off the middle-sized reel on to a small conical spindle. It is then taken to the wheelman, by whom it is wound round the bobbins. Next, to prepare the warp, women and children pass the yarn two threads at a time in and out among rows of bamboo rods about 4 feet apart. It is then spread on two bamboos stretched tight between two posts and sized with rice paste.

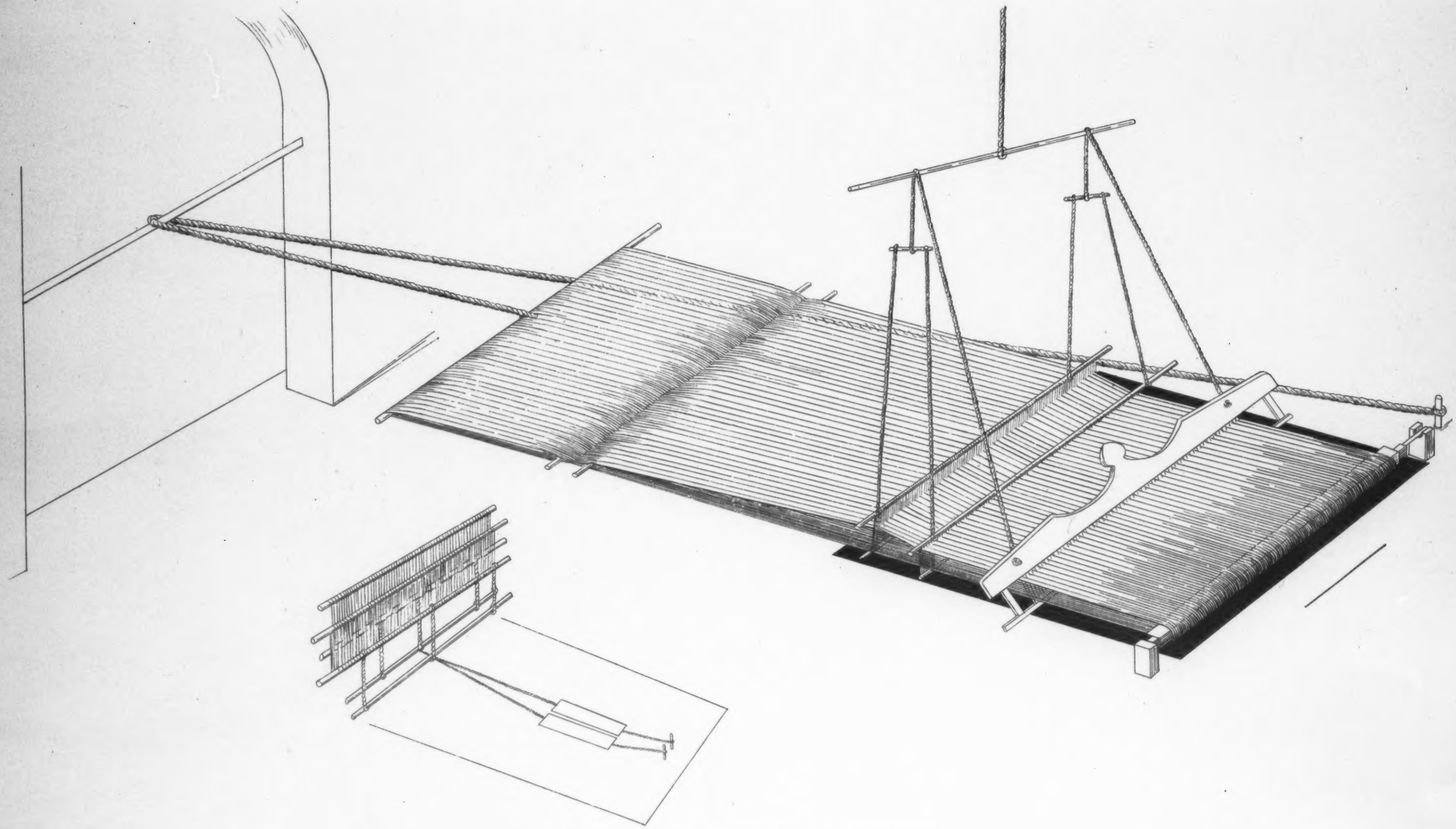
The warping machine consists of a pair of beams supported on a trestle of crossed sticks resting on the ground and made fast by a rope to a peg fixed in the ground. This arrangement is known as a *panjani*, and is a familiar sight in every town and village where weaving is carried on. The *panjani* is rigged up in the streets outside the weavers' houses, sometimes in the gutters or in an adjacent river bed. The length of thread between the beams is from 30 to 50 yards. The warping is usually done by the women and children of the weaver's family, who are to be seen working away in the streets morning and evening, while the weaver and his loom are hidden away in the interior of the dark and ill-ventilated houses.

The process of weaving cotton cloth in Sind is thus described:—The cotton is first carded, then spun and reeled. The reeled thread is kept in water for four days in order that it should become firm. At the end of the period the thread is taken out of water and dried without wringing it; when dry, the thread is divided into two parts, viz., the warp and the woof. The warp portion is wetted in *peji* (a decoction of rice water with an admixture of a little country oil) for about half an hour and then dried by suspending it on wooden posts, three on each side, fixed in the ground in an open space, after cleansing it with a *palat* (brush). When dry, the warp is ready for use. The woof portion of the thread is rolled by means of a spindle or spinning jenny, and is then ready for use. The warp is suspended on wooden posts in the whole of its length. The weaver then sets to work with a number of shuttles by his side. He seats himself in a pit up to his waist and keeps his feet on the *pagtharas* (wooden shoes), which are suspended by straps of leather or pieces of rope to the warp. The *pagtharas*, which are worked with the feet, are instrumental in keeping the two parts of the warp separate from each other. The *naro* (shuttle) with the woof portion of the thread rolled on it is then put in a *nariho* (long hollow iron case) and the latter is tossed from hand to hand to and fro between the upper and the lower parts of the warp. A *rach* and a *hatho* are previously put together and passed through the warp, and as each thread of the woof is put in they are struck against the part woven, in order to bring the weft threads together. As the work of weaving progresses, the artisan goes on turning his *tur* (beam) and the woven portion of the cloth is rolled on it.

In the case of hand-woven yarn used for weaving in Sind, the thread is first spun from cotton on the common spinning-wheel, and the rolls of the same are taken off the spindle. Each roll generally weighs about $1\frac{1}{4}$ tolas. These rolls are again unrolled on a wooden reeling wheel and formed into skeins of single thread. Generally each skein is composed of four rolls of thread and weighs about $1\frac{1}{4}$ sers or a little more. This is considered to be sufficient for one whole piece of common cloth or *jori*, which is usually 24 cubits in measure.

The thread is then opened and placed round pieces of reeds fixed in the ground, to the length of the whole web of the cloth, in such a way that it passes on the reeds inside and outside alternately. When the whole thread is thus unrolled, the reeds are taken out and pieces of thread are placed in their stead. This is the web or warp of the web for the future cloth, or *tani*, or *tanaji*, as it is called. The web is then soaked in water and left to dry. As soon as it is dry, the weavers go to an open piece of ground and fix two cross-posts in the ground at each end of the length of the warp, and the warp thread is then stretched on them. They then brush it with a big brush called *suwari* or *hathio*, in order to make it clean and to detach one thread from another. Then the pieces of thread alternately put for reeds throughout the warp are removed and replaced by thin pieces of sticks, generally of the tamarisk or bastard cypress, each about two feet in length. These pieces of sticks are called *itis*. When the warp thread is thus brushed and made clean, the whole is put in a large flat earthen vessel and wetted for four days in a sort of watergruel made of *jowári* or wheat flour. It is again stretched out on posts in its whole length and brushed as before. It is then ready for weaving.

Before commencing the work a square beam called *tur* is placed in front of the weaver, fixed in other pieces of wood at its sides, so that it can easily turn round as if on an axle. A rod (*gaz*) is then tied to the beam by means of threads, and between them are attached the ends of the warp on one side, in such a way that as the cloth is woven it is gradually rolled on the beam. A post is also fixed at each side of the web in the loom for supporting the warp bridge which is called *kharak*. A comb made of reed slips, fixed in a wooden frame with a handle to move it to and fro, is thrust in the warp thread. Two threads are passed through each space between the two teeth of the comb and one thread in the space left in each treadle. Then the work is commenced by passing the shuttle, which contains a roll of thread to supply the woof, and the cloth is woven by degrees.



12.—Cotton Fabrics of the Bombay Presidency.

Cloth Loom.

THE COTTON FABRICS OF ASSAM.

By H. F. SAMMAN, Esq., Sub-Divisional Officer of Chuadanga, Nadia.

In Assam, as in most other parts of India, cotton cloth is the chief material used by the people for their dress, their satchels, their bed sheets, and their rugs. From time immemorial the inhabitants of this Province have spun cotton thread and woven cotton cloth. The homespun thread and home-made cloth are now giving way before those imported from the West, but as yet they have not been entirely driven out. The cloth now woven is nearly all ornamented in greater or less degree; very little is absolutely plain. The fabrics and the ornamentations they display vary widely over the Province—the fabrics in texture, the ornamentations in design, and both in quality. One of the main causes of this wide variety is the immense mixture of tribes and races found within the Province.

Weaving among the Assamese forms part of a girl's education and part of a woman's ordinary household duties. The women of the family are expected to make their own clothes and those of the men as well. In former days they certainly did so, but now a change is coming over the country. Cotton fabrics imported from Europe and India can be purchased ready-made for a moderate sum, and these, though less lasting, are much finer in texture than those usually made by the Assamese. Accordingly, among the richer classes, the women have given up weaving cloths for ordinary wear and confine themselves to the production of fine cloths delicately and tastefully ornamented with borders and patterns of silk or gold and silver thread. The middle classes, too, have now taken to wearing imported clothes, and it is among them, at the present day, that weaving is at its lowest ebb. The poorer people, especially those living in the interior, still, to a large extent, make their own clothing, as they cannot afford to purchase foreign goods, and, in most cases, too, prefer their own productions.

While weaving as an art, a household duty or a pastime is looked upon with high respect, weaving as a means of livelihood is considered derogatory to almost every class of people (except in Mangaldai). It is only the Katonis, a low weaving class whose products are coarse and rough, and the hill tribesmen settled in the plains, who make cloths for sale and take them to the market. A few old Brahmin widows who have no relations to support them and no other means of livelihood, are driven by dire necessity to sell the cloths they weave in order to eke out a bare subsistence, but even they dispose of their goods as privately as possible.

Such is the nature of the industry in Assam Proper the districts of the Brahmaputra Valley. Among the hill tribesmen weaving occupies much the same position. As the Deputy Commissioner of the Garo Hills remarks, weaving is hardly more of a profession than cooking. Here, however, there is not the same feeling against earning an honest penny by the sale of home-made cloths. Whatever surplus there is in the family is either disposed of to a neighbour or some member of an adjacent tribe, or else taken to the nearest *hât* and sold or bartered for the necessaries or luxuries in demand. With the exception of the Hill Miris and possibly the Akas, all the hill tribesmen are acquainted with the art of weaving, though some are very backward in it. Among them all it is the women who spin and weave; the men have no knowledge of the processes.

In the Surma Valley the nature of the industry is entirely different. Weaving among the plains-people of this valley never was a household industry, but was confined only to the Tantis and Jugis (or Naths), professional weaving castes. Among the Tantis men and boys only, and among the Jugis both men and women engaged themselves in weaving; but among all other classes, except the hill tribesmen, the occupation was considered derogatory for men and women alike. The finer cloths were woven by the Tantis and the coarser by the Jugis. The nature of the industry is the same now as it always has been, but the industry itself has become almost extinct even among the professional weaving castes, who have been driven to agriculture and other occupations now that their own has been rendered unprofitable by the influx of cheap imports from abroad.

To sum up, the cotton weaving industry in Assam is, at the present time, in three distinct stages among the different classes of the people. Among the civilized inhabitants of the Surma Valley the industry may be said to be extinct, and there is little probability of its revival, unless mills be established. There seems no particular reason why cotton mills in Cachar or Sylhet should not be a profitable venture, as the cotton is grown so near at hand, and with the opening up of the country by the railway, cheap labour should be easily procurable. Among the Assamese proper weaving still holds an important position, even in the manufacture of the coarser cloths. It will probably be long before these are altogether superseded by imported fabrics, and the weaving of delicately ornamented cloths will, no doubt, long continue to be a favourite pastime for the wives and daughters of the well-to-do. In the hills also and among the hillsmen who have settled in the plains, weaving is largely practised. But here the industry is rapidly declining, and there is little doubt that its decline will continue. The rough hillsman does not, like the Assamese, disdain to labour on the soil at a daily wage. More and more every year are resorting to the tea gardens, where both men and women can earn a wage far in excess of what they could possibly earn by the most assiduous application to the loom. Others, though not caring to work on the gardens, are turning to agriculture, which they find a more profitable occupation, and buying their scanty clothing from the bazár.

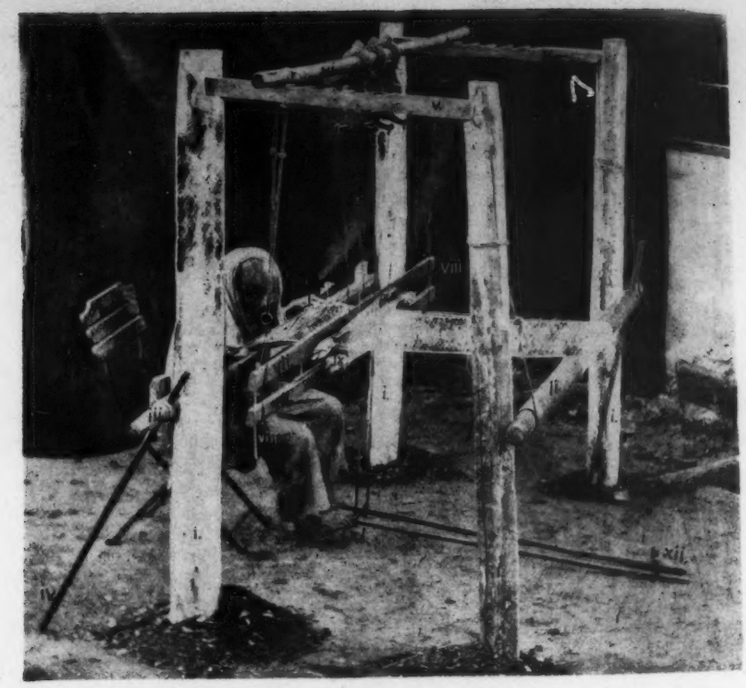
The Process of Manufacture.—The process of manufacture followed in the plains is much more complicated than that used in the hills; but either process is extremely simple compared with those of the West. There is no need to compare the simple instruments made in Assam with the complicated machinery of the English mills, but it may be well to notice some essential differences. In the first place, the cotton usually reaches the mills in England not in its raw state, but with the seed extracted; in any case, the gin is never in the same building as the spinning mills. Thus the process of ginning is hardly considered a part of the spinning and weaving industry. On the other hand, the cotton generally arrives in bales packed by machinery, and in consequence the loosening of the fibre and cleansing it from all impurities form very essential portions of the manufacture and require very careful attention. In Assam the cotton is either raised by the very men who convert it into cloth, or else is brought down from the hills, packed in baskets by hand, and sold to these men in small quantities. There is, therefore, practically no loosening to be done and cleaning is a simple matter, but ginning is an essential branch of the manufacture.

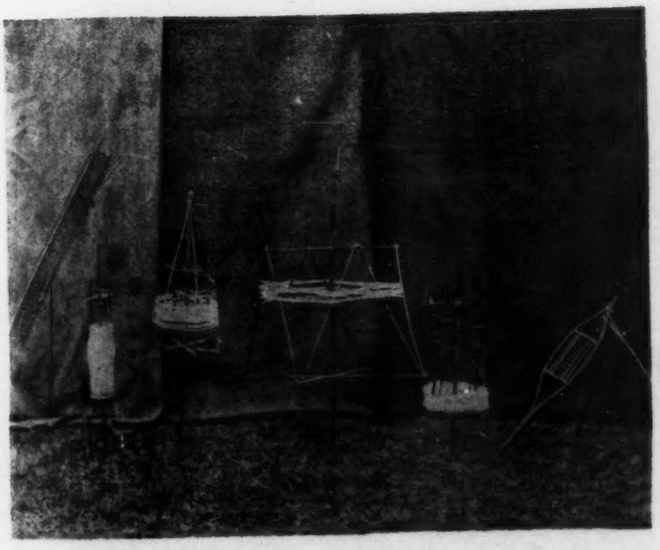
Cleaning raw cotton: The first step in the cleaning of cotton in Assam is to free it from all the impurities with which it has got mixed on the tree while being gathered, or on its journey from the tree to the market. The earthy and vegetable matter thus accumulated is picked out as far as possible by hand. This stage of the process is often dispensed with. The cotton is next spread out in sieves, and exposed to the sun for three or four hours to dry. It is never dispensed with, as it is absolutely necessary to ensure a good outturn when the cotton is ginned. The sieve is of bamboo and can be made by any Assamese. The cotton is now ready to be ginned, unless it be required for making very fine thread, when it is first combed with a comb made of the teeth or rather jawbone of the *borali* fish; this combing effects a double purpose by removing not only the minor impurities left in after the preliminary cleaning, but also the loose and coarser fibres of the cotton. The next stage in the process of cleaning is ginning, *i.e.*, the separation of the seeds from the fibre, which is performed by means of the gin, which consists of two horizontal rollers, one close above the other, mounted on an upright stand.

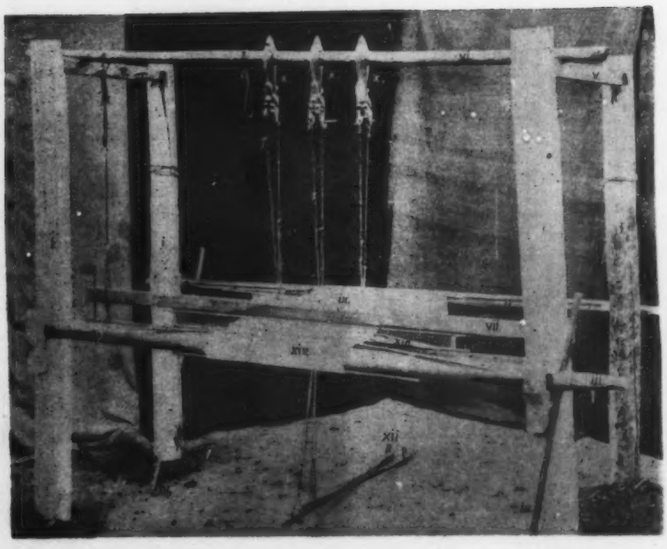
Spinning: At the end of the cleaning process the loose fibres of cotton are gathered up and taken to an enclosure surrounded and roofed with bamboo mats, and there the cotton is bowed. The object of this mat-house is to prevent the fluff from flying about. The bow consists of a single piece of bamboo about three feet long, and rather wider in the centre than at the ends; to which is attached a string made either of a very fine strip of cane or of the midrib of a plantain leaf. To use the bow a mass of cotton is thrown on a mat or the bare ground, and the handle of the bow is held in the left hand in such a position that the string almost touches the loose mass. The string is then pulled by the fingers of the right hand into the mass of cotton and let go. The vibration throws the cotton in all directions and loosens the fibres. A sufficient quantity of cotton having been thus bowed, it is picked up and placed in small handfuls on a smooth wooden stool or on a flat piece of wood with a smooth surface. The operator then places a small slip of bamboo or ekra on a handful of cotton, and rolls it with the open hand over the cotton, which is picked up and wound round the slip. This roll of cotton is then slipped off the slip and is ready for the spinning-wheel. The next stage in the process of spinning is the conversion of these rolls of cotton into thread by means of the spinning-wheel. To work this machine the woman sits facing it, and with her right hand turns the handle, while with her left hand she takes up one of the rolls of cotton and applies the end of it to the point of the spindle nearest to her. The rotary motion of the wheel is communicated to the spindle by means of the connecting cord, and each revolution of the former produces 8 to 12 revolutions of the latter owing to the difference in their diameters. The rapid revolution of the spindle causes its point to pick up a fragment of the roll of cotton applied to it, and as the woman raises her left hand to its full length a thread is drawn out. A slight change in the direction of the extended arm causes this thread to roll up round the spindle, the roll being meanwhile gradually brought down to the spindle point. The same motion of the arm is then repeated till the whole roll is converted into thread, when another roll is taken up and treated in the same way. When the spindle is full the balls of thread are slipped off and are ready for the next process, viz., weaving. The thread thus spun is not often of very good quality. Its thickness and evenness depend on the way in which the roll of cotton is manipulated by the operator. If this be pressed tightly between the finger and thumb and the tension of the thread be kept firm and uniform, the result will be a fine and even thread; if the roll be loosely held, a coarse thread is the result.

In the case of home-spun thread, when the process of spinning has been completed, the thread is left in the form of balls, each having a hole through the centre. One of these balls is taken up and a spindle (detached from the spinning-wheel) passed through the hole. The thread is then wound off the spindle on to a reel. The skeins thus formed are next boiled together in an earthen pot with some rice or paddy. When the latter has been thoroughly boiled, both it and the thread are taken out of the water and the rice or paddy pounded in a paddy-husking machine until it is reduced to a glutinous paste or starch. The skeins are then smeared over with the whole of this paste, and in that state again boiled, after which they are taken out of the water, and slipped over a reel so formed as to allow of the framework revolving round the central rod. From this reel the thread, while still wet, is wound off again on to the first reel, from which the skein is taken off and put on a bamboo rail in the sun to dry.

Weaving.—The weaver takes her seat in front of the cloth-beam, facing the loom. Within easy reach lies the shuttle with a full spool of thread; a supply of more spools is kept on the ground beside her either in a cane basket or more usually in an earthen pot containing a little water to keep the spools damp. A yard stick is also generally at hand for making any necessary measurements; and hanging from the cross-rod above is a little cane basket containing spare lengths of threads to repair breakages. Thus equipped, the weaver commences work. Pressing one treadle with her foot, she raises one shaft of healds and lowers the other, thus making a gap between the upper and lower threads of the warp, and throwing the intersection against the cloth-beam. Through this gap she throws the shuttle with its spool of thread, say, from left to right, holding the loose end of thread on the left of the warp. This end is never fastened or woven in, being simply cut off when the cloth is finished. A thread has thus been shot between the upper and lower threads of the warp, and in front of the intersection. The weaver now pulls the reed towards her and drives home this thread. She then presses the other treadle, thus making a fresh gap between the warp threads, but the position of these threads has been interchanged, *i.e.*, those which were originally above are now below and *vice versâ*. There are, therefore, now two fresh intersections between them, and as the threads are kept at tension by the healds, these intersections lie at their two extremities. Another thread of the weft is then shot and driven home with the reed, the shuttle having been thrown from right to left. Thus the intersection at the weaver's end is woven in. A second pressure of the first treadle again reverses the position of the threads and brings the remaining intersection from the far end and throws it against the weft thread just shot. The position now is, therefore, exactly the same as when the weaving was commenced. Another weft is shot from left to right and the weaving is continued, the same process being repeated again and again.







13.—Cotton Fabrics of Assam.

Looms and Reels.

COTTON FABRICS OF THE NORTH-WESTERN PROVINCES AND OUDH.

By CHAS. A. SILBERRAD, Esq., B.A., B.Sc., I.C.S.

The only kind of cotton grown in these Provinces which is of commercial importance is the short-stapled variety known as "Bengals"; this includes various kinds known to botanists as *Gossypium herbaceum*. These Provinces, as regards cotton-growing, may be divided into two parts. The first, including Oudh and the North-Western Provinces east and north-east of Allahabad, grows little cotton, the quantity diminishing as one proceeds east. Here production, as a rule, is insufficient to meet local demands. The second includes the remainder of the North-Western Provinces. The most important cotton-growing districts are those of the Jumna-Ganges Doáb and Bundelkhand. Here exports largely exceed local consumption. Cotton cultivation extends but a short distance up the slopes of the Himálayas, a little only being grown in the southern portions of Garhwál, Naini Tal and Almora. The total area under cotton varies about 1½ million acres, generally rather exceeding that amount, while the outturn probably lies between 750,000 and 1,000,000 cwts. Of this amount approximately three-fourths are exported; the remainder is used locally, about one-third probably being employed for quilting purposes and the remainder spun. But that which is used for quilting ultimately to a considerable extent is spun, the cotton being removed after the quilted article is worn out; the extent to which this is done varies with the price of the fresh cotton.

Ginning.—Cotton is always picked before noon, so that the bolls shall be still damp from the dew, and so come away easily without much admixture of "leaf." The cotton so picked is termed *kapás* and is rarely ginned by the grower. He generally sells it as such to a *bania* at some large village, who has it ginned. For ginning there is but one instrument in use throughout the Provinces. The essential parts of the instrument are the two rollers, one of which is usually of iron; the other (the lower one) is of wood. These are geared together by an endless screw, so that when the wooden roller is turned by the handle the iron roller rotates also. The rollers are fitted into two wooden uprights 18 inches to two feet in length, inserted into a flat piece of wood forming the base of the machine. To secure greater stability, a piece of wood is fixed at right angles to the base. There is usually a piece of cloth fixed to the two uprights so as to hang down below the rollers to the wooden base of the machine. The worker turns the handle with one hand and presses seed cotton between the two rollers, which are so fixed as to press moderately tightly against each other. The floss is thus caught between them and dragged off the seeds, which fall down on the side on which is the worker; while the floss passes through and falls on the opposite side, seeds and floss being prevented from mixing by the cloth above mentioned.

Cotton Cleaning.—After being ginned, cotton intended for export is taken to the nearest cotton press, of which there are many in these Provinces, there made into bales, and then despatched to where required. That intended for local consumption requires to be opened up, cleaned and made into a form ready for spinning. The preliminary processes in the mill-industry are "opening," "scutching," "carding," "combing," "drawing," "slubbing," and "roving." In the hand industry the preliminary operations result in the production of a sliver (termed *púni*), corresponding closely to the state of the material after being carded in the mill industry. All the subsequent processes, which result in attenuating the sliver and imparting a slight twist thereto, are performed by the spinner at the same time as he does the actual spinning. The ginned cotton is, as a rule, first roughly picked over by hand, usually by the person who will spin it, or by some members of the family. It is then handed over to the professional cleaner to undergo the process termed *dhunna* or in the hills *phatakna* or *phánna*. The basis of all methods is one and the same, viz., to cause a tightly-stretched string to vibrate in a heap of cotton; the vibrating string separates and opens the matted masses of floss as pulled off the seeds in ginning, thereby greatly increasing the bulk and shaking out dust, dirt and other impurities, which gradually settle down to the bottom of the heap.

Spinning.—The wheel is termed *charkha*, *rahta* or *phirka*, and consists ultimately only of a mechanism whereby the spindle or sharp pointed thin iron rod can be rotated at a high speed. This is effected by connecting the spindle by an endless string with a large wheel. To spin, the operator—usually a woman—squats with the wheel in front of her and the driving wheel on her right hand, with which she turns it; the projecting end of the spindle is thus towards her and on her left; she then takes a *púni* and draws out a little of the cotton at one end and twists it by hand, so as to make about four inches of truly handspun yarn (which is left attached to the remainder of the *púni*). The yarn is made to adhere to the spindle, and the spinning proper commences. The spindle is caused to rotate very rapidly, and at the same time the left hand is drawn up so as to reach about two feet from the point of the spindle; the fingers simultaneously pushing out a little of the cotton of the *púni*, the rapidly rotating spindle twists the cotton as it is drawn out, thereby producing yarn. When sufficient twist has been imparted, the spindle is rotated slowly and the yarn allowed to coil itself on the projecting part of the spindle behind the point. To prevent the spun yarn working backwards and becoming entangled with the bearings of the spindle, a leather stop is sometimes put on the latter. The process thus continues till the whole *púni* is spun, when a new one is taken and a little yarn spun from the end, but instead of being caused to adhere to the spindle it is twisted into the end of the yarn already spun. The yarn so wound on the spindle forms a double cone truncated at one end if a *dhibri* is used; this is known as a *kúkri*, and is then wound into skeins by aid of an *ateran* or of a *paraita*. The latter is, however, more often used as a support for the hank, when it is to be wound on to the *nalis*, the small reels used in laying the warp.

Warping.—The next process is to lay a sufficient number and length of threads of yarn parallel to form the warp of the fabric to be woven. The yarn, whether hand-spun or machine-made, is usually obtained by the weaver in the form of skeins or hanks. They are soaked in water for 24 to 48 hours and then wound on to suitable sized reels. To do this the skein is supported either on the *paraita* or on an instrument serving the same purpose, termed *pari* or *charkha*. The skein is wound off these on to the reels by turning the spinning-wheel, the wheels being replaced by others as they get filled. The warp is first laid on an arrangement of sticks termed *pariya*. Four stout sticks are firmly put in the ground. Two rows of light straight sticks, 2½ to 3 feet long, are placed in sets of four; all four are stuck in the ground as close together as possible, but diverging at the top so as to form

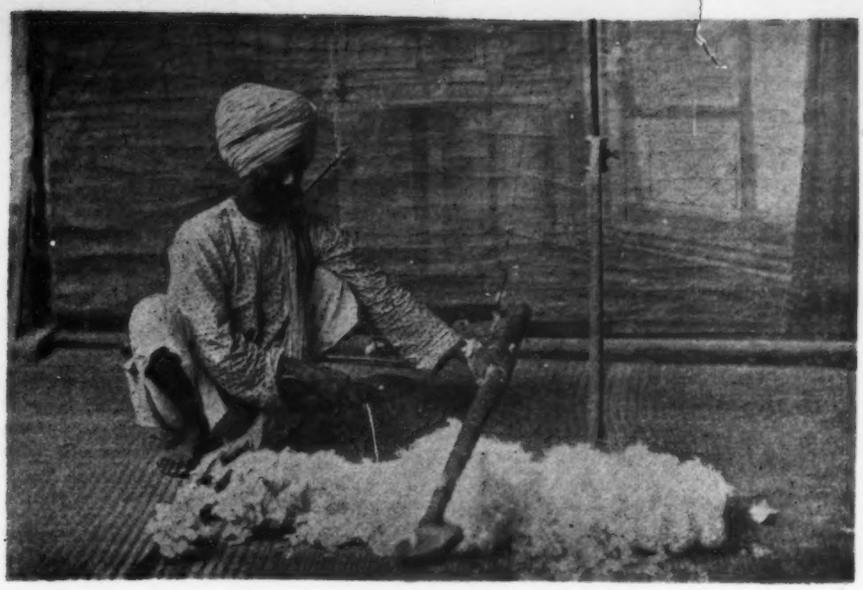
the corners of a square, each side of which is about 10 inches. The distance between each successive set is three to four feet. A large reel of yarn is slipped on an iron nail, some 8 or 9 inches long, with a head sufficiently large to prevent the reel falling off. This nail is inserted head downwards into a hollow stick about two feet long, in which it is kept by friction. The warper takes two of these in his two hands, and beginning from the large stick at the end of one of the rows lays the yarn round the lighter sticks, going outside the first and inside the next, repeating this till the end of the second row is reached, when he returns, this time laying the yarn the reverse side of the sticks. The yarn is supported by the tension and the friction against the sticks, against which it presses by reason of its being placed alternately one side and then the other, besides being supported by the slant at which they are. The warper continues the process till a sufficient number of warp threads for the breadth of cloth to be woven is laid. The result of the arrangement is to produce a cross between every pair of sticks whereby each successive thread is kept separate throughout its length, and to prevent successive threads from getting mutually entangled. After sufficient warp is laid, a thin bamboo of a length slightly greater than the breadth of the cloth to be woven is inserted just one side of each set of four sticks, so that it slides between the two layers of warp. Its two ends are united by a piece of yarn; this maintains the crossed arrangement of the warp threads when the sticks are removed. This now follows, but the large sticks are left at the ends, and the whole rolled up and starched by immersing in starch water.

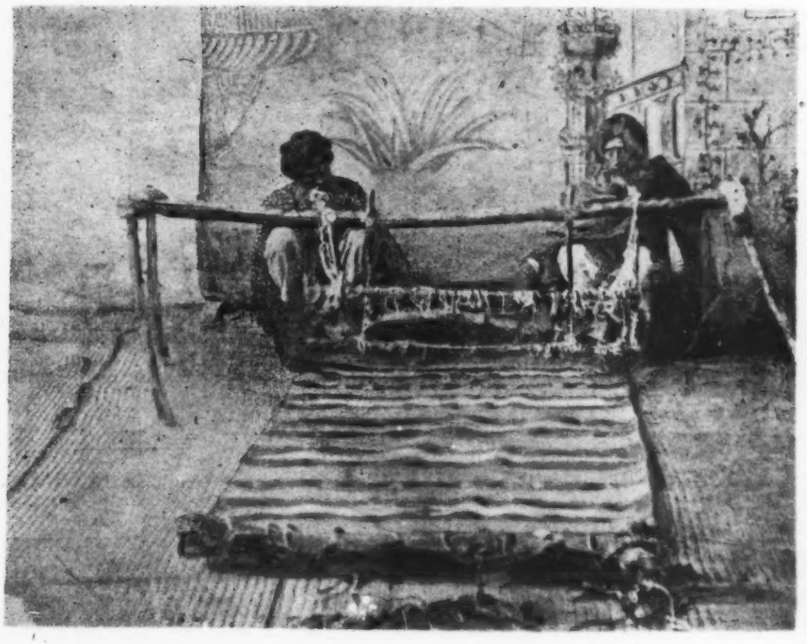
The warp is then stretched horizontally on another system of sticks known as the *mánjhá*. This consists merely of a series of pairs of sticks stuck in the ground so as to form a letter X at such intervals as are needed to support the warp; the upper ends of the pairs of sticks are united by rope, while the warp is kept taut by attaching the stout sticks at the two ends to pegs firmly fixed in the ground. The warp threads are kept apart to a proper breadth by the bows inserted as before described. The starched warp is put on this arrangement and brushed longitudinally with a large brush made of *khaskas* (the roots of the *gandal* grass), or sometimes of cocoanut fibres. It much resembles an English carpet broom, but without the long handle. After the starch has dried the brush is usually oiled with oil of mustard. This operation smooths the yarn, causing loose ends to adhere to the main thread; at the same time any broken ends are mended by twisting the ends together. Lastly, the bamboo sticks which have so far separated the two layers of warp are replaced by stout yarn only, which is tied tightly so that the warp appears merely as a thick and long skein. It is all rolled or twisted about one of the stout sticks still remaining at the ends, and thus kept till required to be put on the loom.

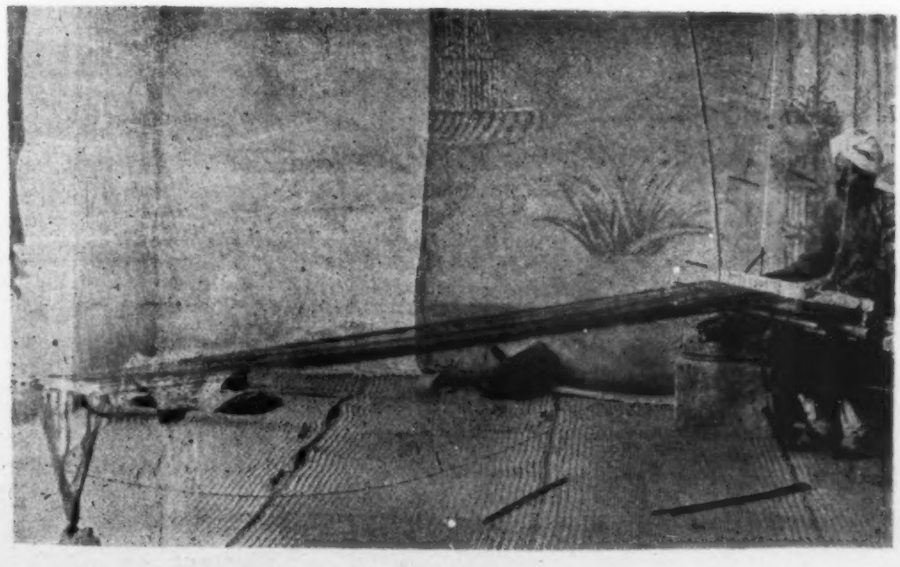
Weaving.—There is practically but one form of loom in use throughout these Provinces. The whole arrangement is always under cover and raised but a few inches above the level of the ground: consequently to enable the weaver to sit at his work a hole is excavated some 18 inches deep, wherein he sits, so that the beam is immediately above his thighs. The process of laying the warp as described results in an endless warp, each thread of it turning over the stick at the extremity, and continuing as the corresponding under-thread. The warp threads are now all cut at this extremity and one by one passed through the appropriate loops in the heddles and space in the "lay," and firmly attached to the beam. As this is a very tedious process, it is usual to do it once and for all; a sufficient length of warp thread is left unwoven to pass through the heddles and *ráchh*, and the new warp simply attached to the old, each thread being twisted (not knotted) on to the old warp. It is obvious that so long as the same arrangement of heddles is adhered to and the same breadth of cloth woven, no change is required. In fact, many weavers have *ráchh* and heddles with a small strip of woven cloth and warp passed through them which have been in use from their fathers' times. This is specially the case with the choicer patterns. At Saháranpur I was shown such an arrangement containing 16 heddles which none of the weavers then living knew how to use. The whole length of warp spread out horizontally is from two to four yards, according to the space available. The warp is kept stretched properly by an arrangement known as *bhanjhní*, consisting of three smooth and stout bamboos placed above and below the warp and tightly bound together, so that the threads cannot slip between them. To the ends of this are attached two cords, which join, whence a single rope passes over one or more pegs, and is attached to the peg which is within easy reach of the weaver's right hand. As weaving proceeds and more warp is required he loosens the rope and winds the woven cloth on to the beam. The remainder of the warp not yet stretched horizontally between the beam and the *bhanjhni* is hung loosely over a bamboo. It will be remembered that in the warp, after the final brushing, the bamboos which kept the crossings of the successive threads intact were replaced by ties of thread. When stretched on the loom these ties are again replaced by sticks, of which several varieties are used.

The shuttle is usually made of sheet iron and is very similar to the old shuttle used in Europe. In shape it is like a canoe, the similarity being increased by the way the two ends are covered in. Along the centre is a thin iron pin which can be lifted up at will. On to this the *nari*, on which the weft yarn (which is always moistened before weaving) has been wound, is slipped and fastened down. As each fresh *nari* is put into the shuttle the iron pin is oiled, for which purpose the weaver generally places an oil lamp near his right hand.

After the warp has been spread on the loom and all the instruments used made ready, weaving begins. The appropriate heddle is depressed, and the shuttle passed from one side to the other between the warp threads so depressed and those left above. The weft thread so put in is driven into the proper position by the lay (*hátha*), and the other heddle depressed, the shuttle passed back, and the process continued. When weft stripes are required, yarn of the appropriate colour is inserted in the spindle and the required number of weft threads of this colour is inserted. As a rule, when this is done several shuttles are used. The dimensions of the loom and of its adjuncts vary with the breadth of the cloth to be woven, but it is rare to find a loom capable of weaving cloth much over three feet in breadth.



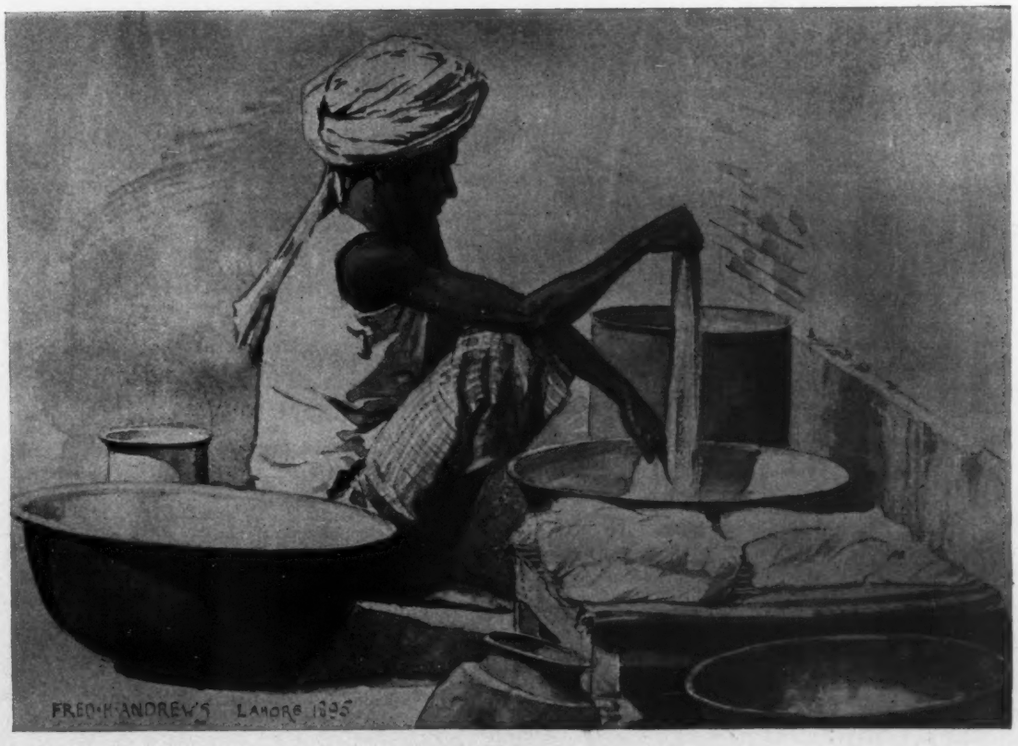




14.—Cotton Fabrics of the North-Western Provinces and Oudh.

Spinning, Weaving, &c.

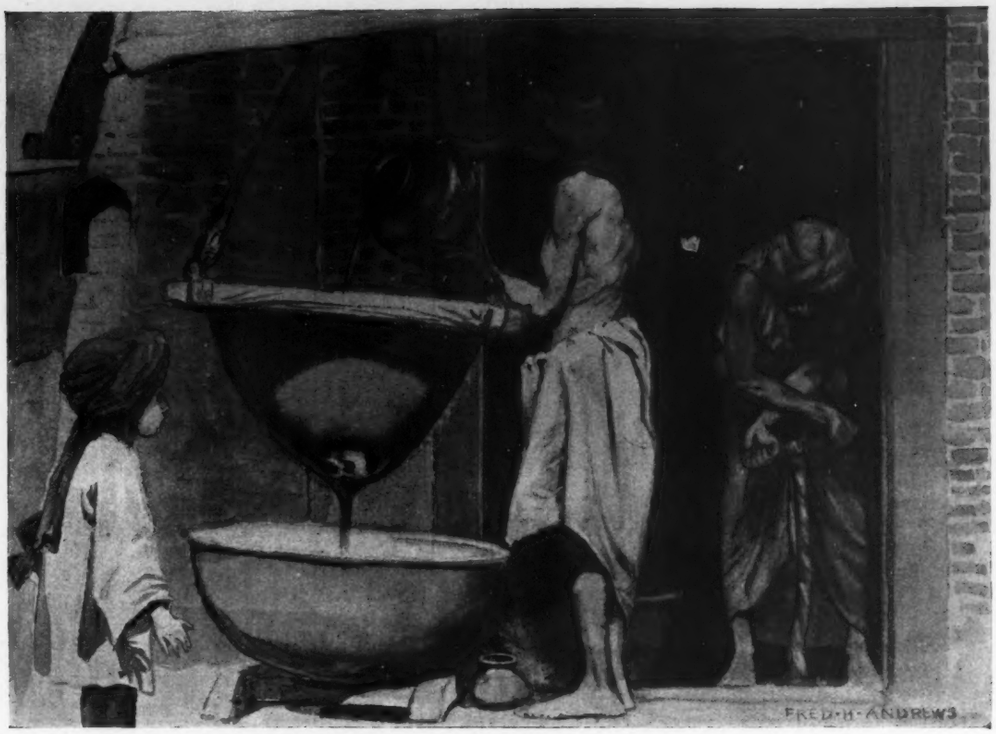
Preparing rice-starch.



14*a*.—Dyeing in the N.W. Provinces.

Starching.

(*From drawings by Mr. Fred. H. Andrews, Lahore*).

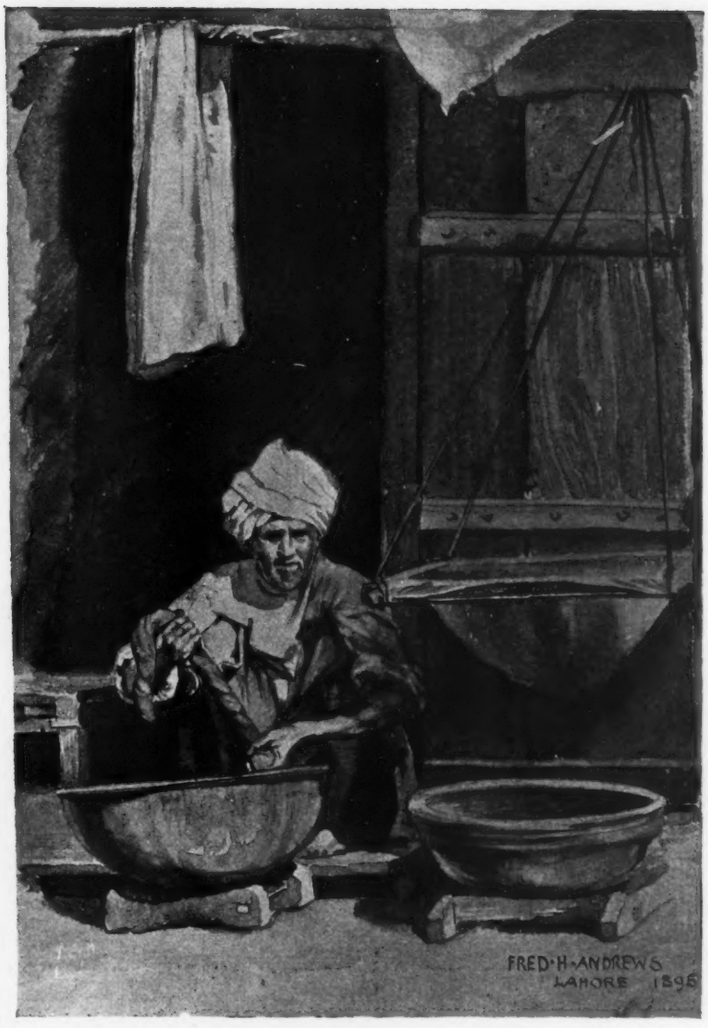


Straining Dye.

14*b*.—Dyeing in the N.W. Provinces.

Cotton Printing.

(From drawings by Mr. Fred. H. Andrews, Lahore).



14*c*.—Dyeing in the N.W. Provinces.

Dyeing.

(*From a drawing by Mr. Fred. H. Andrews, Lahore*).

SILK IN BURMA.

By J. P. HARDIMAN, Esq., I.C.S., Assistant Commissioner.

There is no mention in authentic historical record or local legend of the source from which the silk industry was brought into Burma, of the channel which it followed, or of the manner or date of its introduction. There is a similar silence concerning the introduction of silk into India generally. The weight of opinion favours China as the fountain country. Philologists point out that the equivalents in other languages of the Chinese *szu* (silk) are phonetically allied to that form, and quote *sericon* (Gk.), *sericum* (Lat.), *soie* (Fr.), silk (Eng.) and others. Even the classical name of the country (*Seres*) is said to be derived from the *szu* which was its chief product, though the lay reader might suggest that it is equally probable that the product was named from the country.

Perhaps a safer basis to take in reviewing the question of the birthplace of the silkworm is a consideration of the habitat of those forms of food which are most congenial to it. Building on this foundation Hutton holds that all forms of the domesticated mulberry-feeding insect came from the north-western tract of China, where a temperate climate favoured their development, and thence spread later to India, where they are purely exotic.

Neglecting varieties which are not reared in large quantities, it may be said that the silk crop of Europe is got from a worm which thrives in a temperate climate, requires cold for the hatching of its eggs, and produces but one crop of cocoons in the year; these cocoons, however, contain a large amount of silk, which can be easily reeled. In Burma and in India generally, on the contrary, the silk crop is produced by smaller varieties, which thrive in sub-tropical climates, do not require cold for the hatching of their eggs, and produce each year several crops of cocoons: these contain a comparatively small amount of silk, in quality perhaps equal to that produced by the European worm, but so loosely wound upon the cocoon that it is almost impossible in reeling it off to prevent entanglement and thus to produce a thread equal in value to the thread easily obtained from the European variety. For facility of classification the whole body of silk-producing worms is divided into two classes:—(1) Domesticated or mulberry-feeding; (2) Wild or non-mulberry-feeding, feeding for the most part on the leaves of trees and plants that grow within the jungle. The term "wild" is used more in a commercial than a literal sense, for many of the second class, though they do not feed on the mulberry, yet, like the *tusser*, have been for many centuries domesticated in India and China. In Burma each of these classes is exemplified, but three species only are of importance enough to demand detailed consideration. These are, of (1) the *Bombyx Arracanensis*, or *Ngapaw*; and of (2) the *Cricula Trifenestrata* and the *Attacus Atlas*. The *Bombyx Arracanensis*, one of the numerous sub-species of the *Bombyx Mori*, the source of the silk of commerce, is a multivoltine silkworm, or one which goes through many generations in the year, and it may be doubtfully regarded as distinct from the *desi* and *Madrassi* races of Bengal. It is the peculiar form bred in Burma and hence got its specific name, which was assigned by Captain Hutton. It is said to have been introduced from China.

Of the *Cricula Trifenestrata* Manuel furnished the following account in 1884:—"Among domesticated or wild silk spinners, although a number are to be met with in all three divisions of the Province, the most notorious and the most extensively spread is the *Cricula fenestrata* or mango silkworm, called by the natives the *thayetpo* because it is usually met with on the mango or *thayet* tree." The worm is multivoltine, working all the year round, though most extensively and vigorously during the rains. The cycle of its existence is from 55 to 62 days.

The *Attacus Atlas, Linn.*—This moth is well known on account of its great size, some of the specimens in the Indian Museum being more than ten inches across from tip to tip of wings. According to Manuel, the insect spins once a year in its natural state, though in domestication in Burma it will spin twice or even three times—once at the commencement of the rains, once during the rains and again at the close of the rains, the best cocoons being those formed towards the beginning of the cold weather. The cycle of its existence is from 81 days to 8 or 9 months.

Reeling.—"After the cocoons have matured and before the exit of the moths they are prepared for reeling. Torn away from the cocooning trays by handfuls, they are thrown into baskets, and then the women and children of the family divest the pods of all their waste or floss. Then, without sorting or selection of any kind, except that the yellow and white pods are kept apart, the cocoons are put into a *chattie*, or earthen pot of water, and slowly simmered over a fire. The reeler (generally a woman who makes it her sole business to reel silk) tries the pods after they have simmered for a while, and as soon as she finds the fibre come away easily she picks up a handful of cocoons, each by a thread of silk,—the number usually being from eighteen to twenty-five—shakes them well to a sufficient length, and then runs them through a loop of brass wire on to a reel fixed to a pair of cross sticks of bamboo. From the reel the filaments are given a slight twist and carried on to a cylinder of wood with a handle and turning on a trestle. One woman manages the whole operation. She sits beside the fire, opposite the pot, over which the cross sticks with the loop and reel are supported. In her right hand she holds an iron fork, with which she regulates the outcome of the threads from the pot, and with her left she turns the handle of the cylinder of wood, on which the silk is reeled. Some practice is necessary to attend to and carry out operations with both hands so as to produce a tolerably even and fine thread, and good reelers generally command good wages, so that it is difficult to get one to leave her home. As much silk having been obtained from the cocoons as is possible, the pods are then taken out of the pot and whilst still moist and warm are stretched into a kind of coarse knobby thread, which finds a sale in the markets for coarse work."

Winding and Spinning.—The weaver places the raw silk over the winding machine, which is roughly constructed to receive the huge coil as purchased. From this the raw silk thread is unwound and passed over a large reel. The person manipulating the wheel feels the thread as it passes on to the reel, and cuts it off when a skein of different texture is reached, winding the silk thus on separate reels for the medium, the coarse and the fine. The medium threads are used for the warp, and the coarse and fine for the shuttle. The large reel is taken off its frame and hung up, and one end of the thread being wound round the reed-reel or spool, the spinning wheel is set in motion. All the raw silk thread is thus transferred in certain lengths to the reed-reels or spools, and when all

the thread has been thus removed the reed-reels are placed in a basket and the threads are then twisted into singles in the combined machine. The process is as follows:—The spools, usually eight in number, are fixed on to eight iron spindles attached to a large *yit* or spinning wheel. This has two wheels; that on the left has four strings passing round it. These strings in turn pass round each row of spindles placed one above the other, and thus each turn of the wheel revolves the spindles simultaneously. Each line of thread from each spool passes through an eyelet placed about twenty inches away from the quill-stand on to an eyelet on the main stand. The thread finally makes a skein round the reel fixed above the spinning-wheel and revolved by the motion of that wheel. The spinner holds the threads in the palm of his hand between the two rows of eyelets in order to make the skeins round the top wheel tight and to prevent the skeins intermingling. To loosen the skeins of spun silk and to facilitate their removal from the reel, a movable wedge is fixed in it. This increases the circumference of the reel, so that when the wedge is removed the skeins are loosened.

Cleansing and Dyeing.—After the silk has been twisted into skeins, four measures of soap sand are mixed with water and the mixture is put to stand for a night. The heavier ingredients settle at the bottom and leave the soapy water on the top. This is then poured into an iron cauldron or earthen pot and placed over a furnace. When the water reaches the bubbling point, the twisted silk in skeins of about fifty threads is put into the hoop of a bent cane or *gauk*, which serves as a handle. The skeins are plunged into the water and kept there till they become coarse to the touch. They are then taken from the pot and the water is squeezed out by holding the *gauk* with one hand and with the other hand forcing a piece of stick into the other end of the skein. The skein is then cooled and washed in cold water four times to bleach it. The water is wrung out and the silk is dried for a day. The white silk has by this time become pure white, and the yellow silk pale yellow. Imported aniline dyes are now taking the place of the old vegetable products. Dyes of different colours in powders or cakes, put up in paper packets or in tins, are procurable in most bazaars. There is no doubt that the old methods will, except in out-of-the-way places, soon be entirely abandoned and the less troublesome prepared dyes of the market used.

Weaving.—The loom (or *yekkansin*) consists of a frame with four small perpendicular posts, forming a rectangle measuring about four cubits by two-and-a-half. These are connected by bars at the top, in the middle, and at the bottom, a few inches from the ground. On the near, middle, and farther top side of the longitudinal bars rests a pair of rollers (*leik*) at the full distance of the length between the middle latitudinal bars. The roller at the nearer side, where the operator's seat is, is employed for rolling the finished fabric. On the other roller opposite are the threads which form the warp. To separate the threads of the warp into the alternately upper and lower rows, so as to allow of the shuttles being passed between them to make the web, are two comb-like frames (*hnat*), closed by a bar at the points of the teeth. Stout cotton threads form the teeth of the closed comb. These combs are hung at their respective ends by sliding looped cords resting on a round bar, usually a piece of bamboo placed across the top longitudinal bars of the main frame. Beneath the knot is a latitudinal cross-bar on which are placed two pedals (*che-nin*) for the feet of the operator; the toe-ends of these are connected by cords with the combs, to enable the weaver to alternate the two series of threads of the warp by alternately pressing the pedals with his feet.

Placed in front of the combs and nearer to the weaver is a third frame (the *lek-khat* or *yinthwa*), like the combs, but with twice as many spaces as each *hnat* has, to permit of all the threads of the warp being passed through the interstices; these are made of very fine slit bamboos. This third frame, which is employed for pressing the threads of the weft close together, is suspended at its ends by cords made fast to an independent cross-bar placed over the two top longitudinal bars of the main frame. Finally, there is the shuttle (*lun*), the body of which is made of hard black wood (*yindaik*), or, if large and for white fabrics and fabrics of simple patterns, of the almost equally hard red wood (*padauk*). The spindle is manufactured out of hard bamboo. A hundred of the former cost three rupees and one of the latter costs four annas. An entire weaving frame with all appurtenances costs about ten rupees.

The preparation for work is as follows:—The threads for the warp where the weaver sits are looped on to the roller (*leik*), and after passing through the interstices of the pressing comb (*lek-khat* or *yinthwa*), pass alternately through the lifting and depressing combs (*hnat*), then from under the farther roller (*leik*), round it, and over the top of the cross-bar and roller at the farther top part of the frame, till they reach the top bar above the weaver's head, where they are gathered into a bunch and secured to a piece of wood made fast to the top bar overhead, to allow of the worker paying out the warp thread as the fabric grows and is rolled up on the roller in front of him. The seat is a rough bench, usually made of a movable plank, with two holes let into projecting parts of two upright posts fixed into the ground.

LIST OF ILLUSTRATIONS.

Woollen Fabrics of the Bombay Presidency.—10. Cleaning wool; measuring threads and spinning woollen yarn; sizing the warp. 11. Broach peasant wearing "Ghumti"; woollen hand loom.

Cotton Fabrics of the Bombay Presidency.—12. Cloth loom.

The Cotton Fabrics of Assam.—13. Looms and reels.

Cotton Fabrics of the North-Western Provinces and Oudh.—14. Spinning, weaving, &c. 14*a*. Preparing rice-starch; starching. 14*b*. Straining dye; cotton printing. 14*c*. Dyeing.

Silk in Burma.—15. Trays of eggs; transfer of raw silk thread to reel; cocoons; reeling the silk. 16. Transferring raw silk thread to reed reel; another method of reeling; baking cocoons. 17. Spinning machine; spinning machine at Kothan; frame used before laying the warp; winding; cleansing silk. 28. Dyeing; frame used preparatory to weaving; another method of winding; loom frame. 19. Winding warp thread; rolling warp threads on to the *leik*; the loom; transferring Singapore silk from one reel to another. 20, 21. Fabrics.

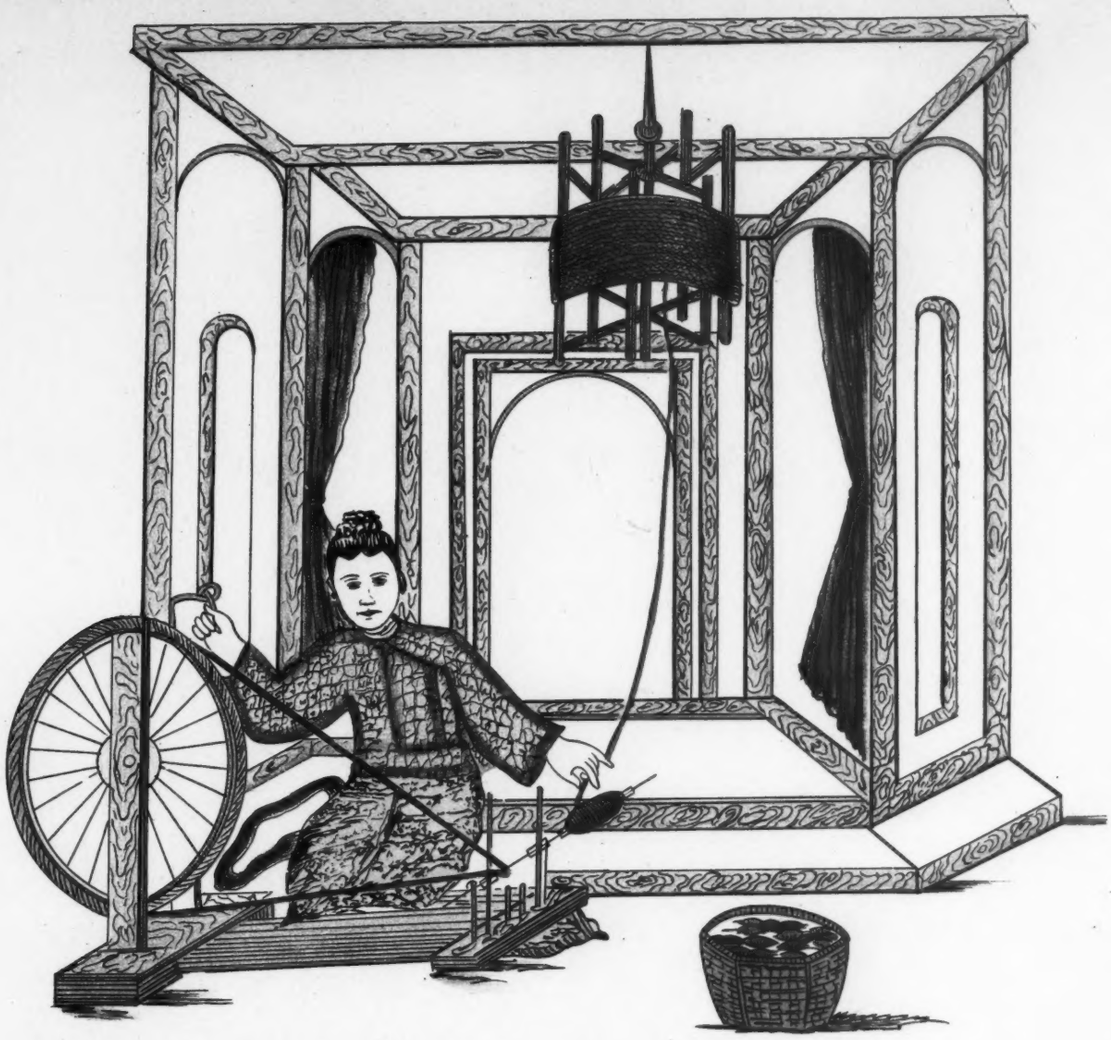
Trays of eggs.

Transfer of raw silk thread on to the reel.

Tray of Cocoons.

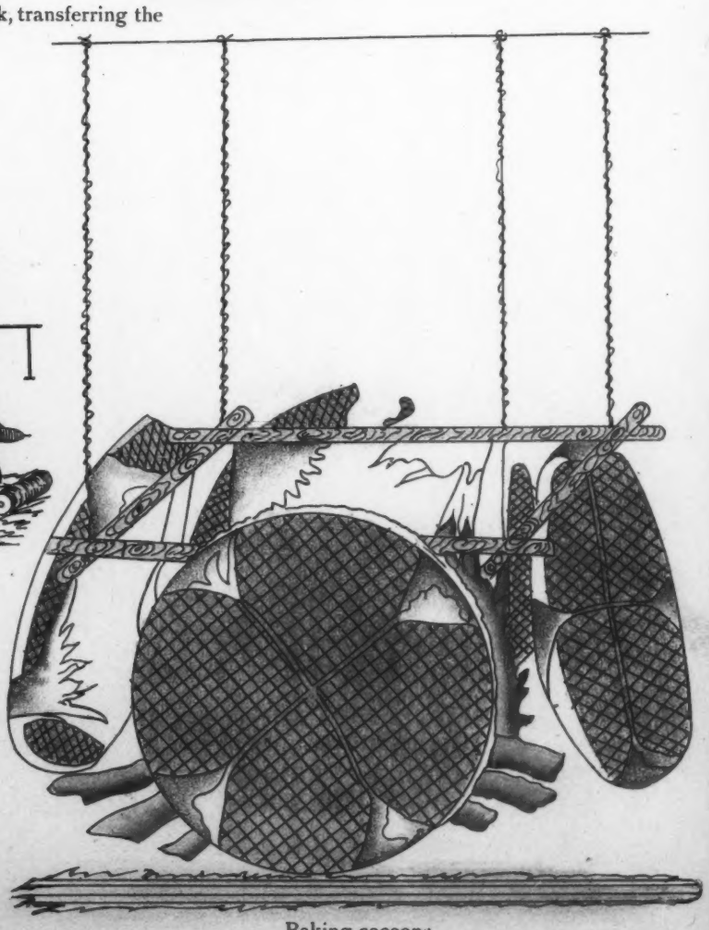
Reeling the silk.

15.—Silk in Burma.



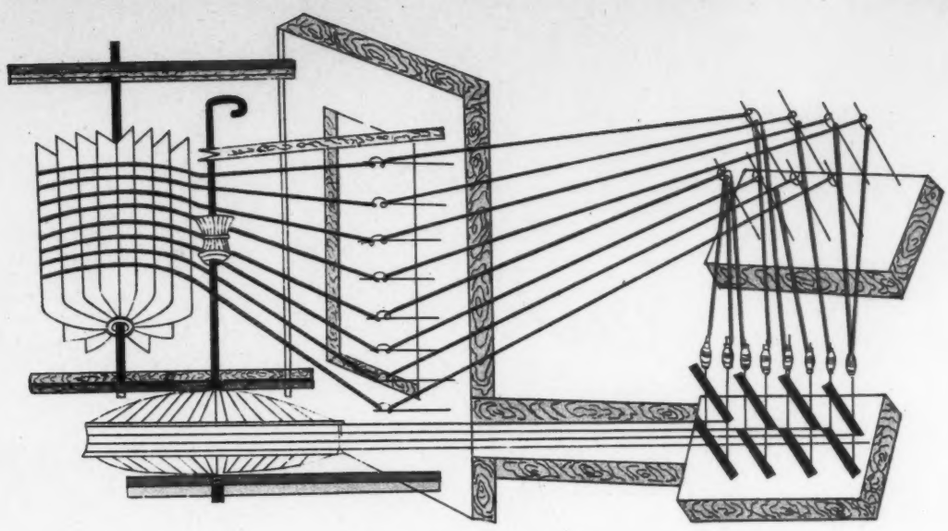
Showing the large reel hung up and the spinning wheel at work, transferring the raw silk thread on to the reed reel.

Another method of reeling.

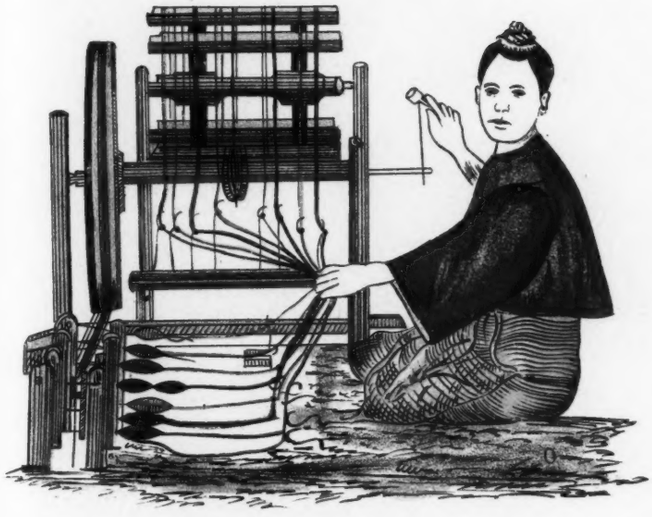


Baking cocoons.

16.—Silk in Burma.



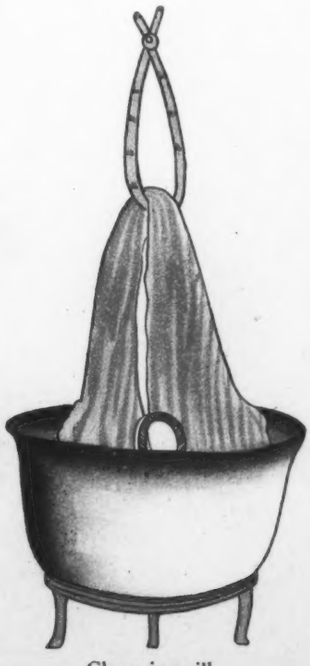
Spinning machine.



Spinning machine at Kothan.

Frame used before laying the warp.

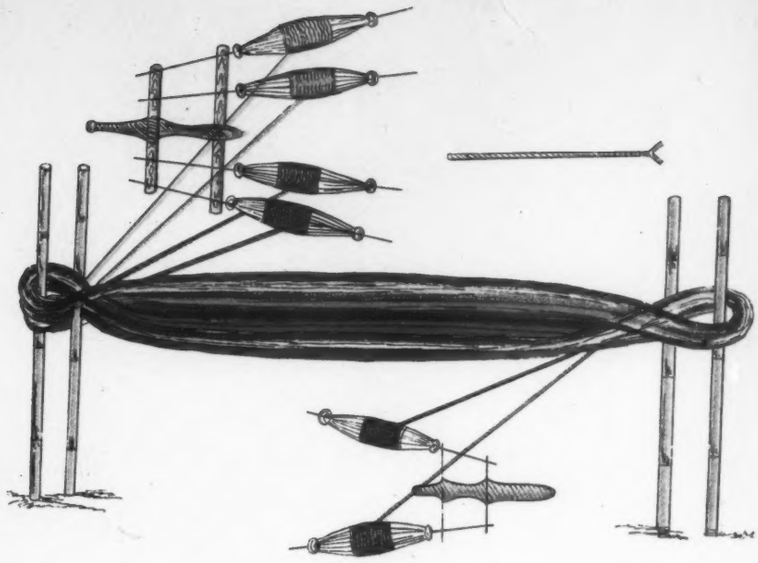
Winding before laying the warp.



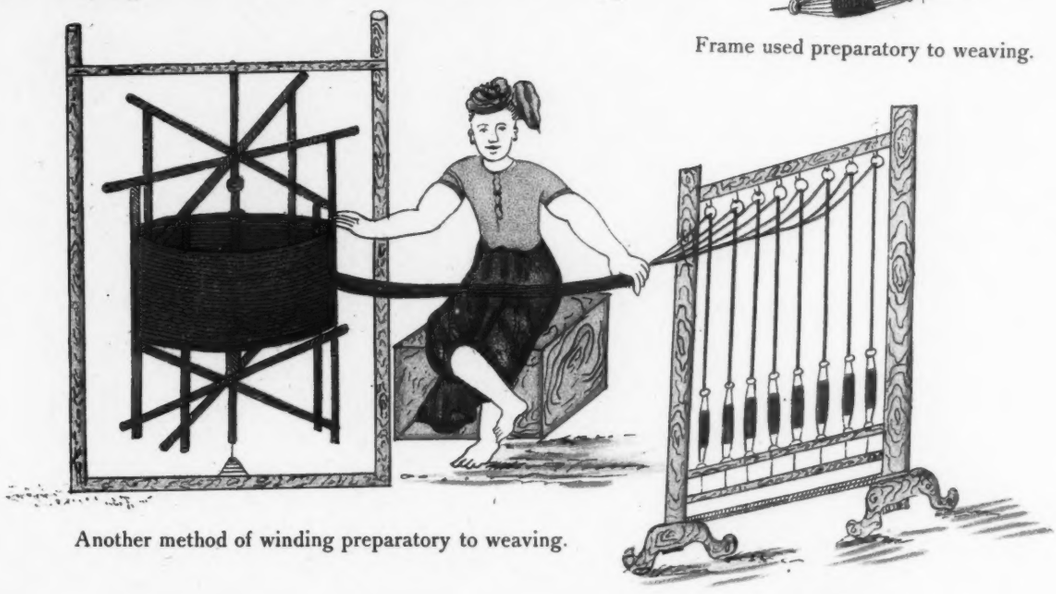
Cleansing silk.

17.—Silk in Burma.

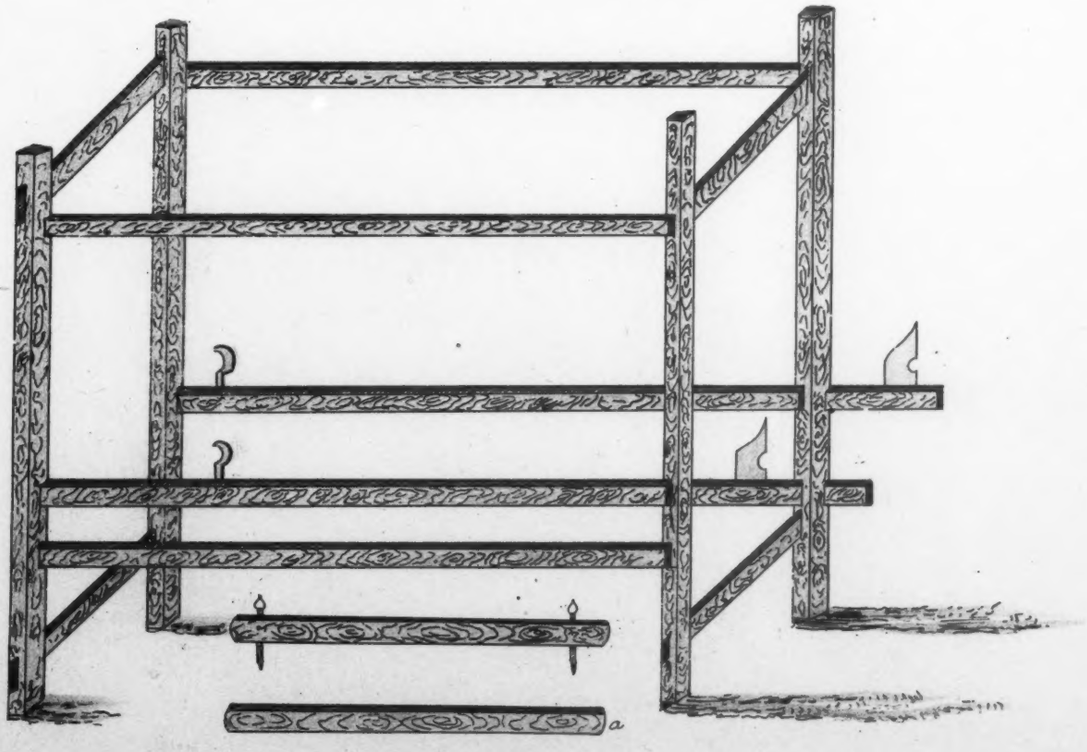
Dyeing.



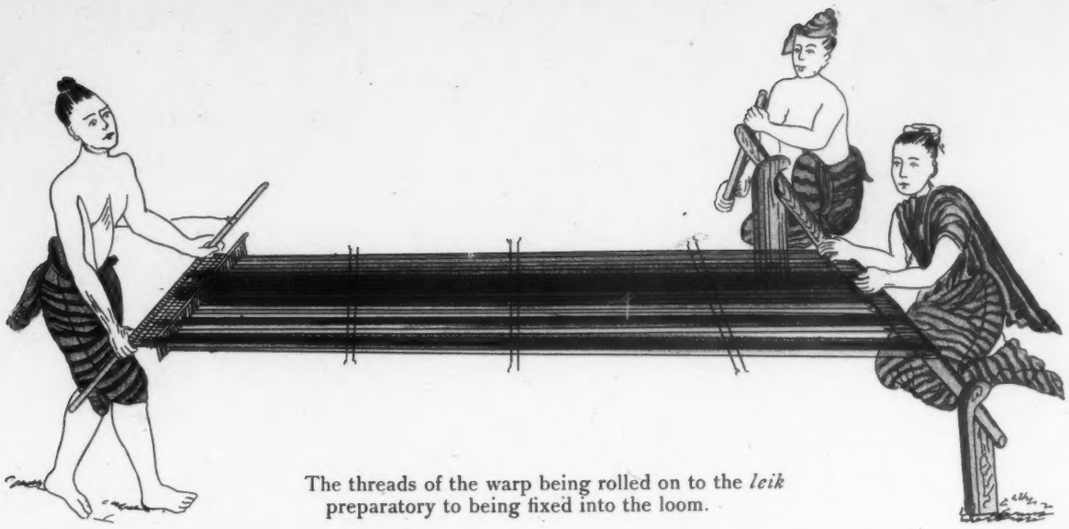
Frame used preparatory to weaving.



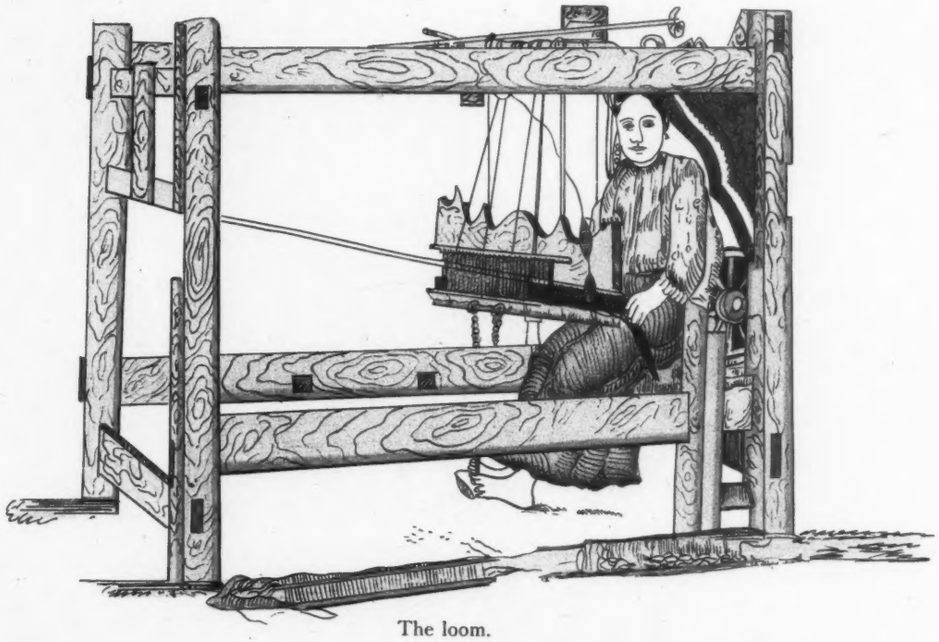
Another method of winding preparatory to weaving.



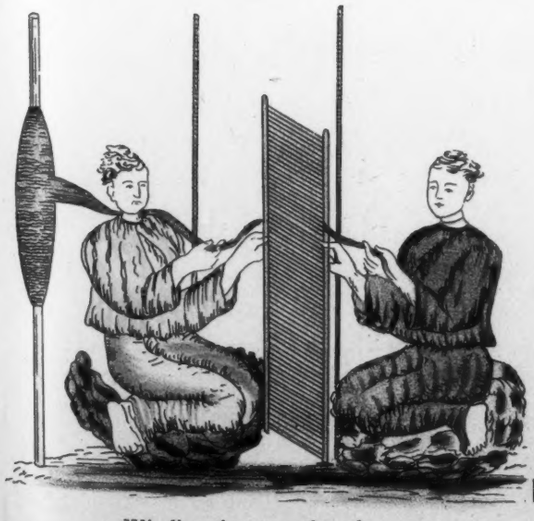
Loom frame.



The threads of the warp being rolled on to the *leik* preparatory to being fixed into the loom.



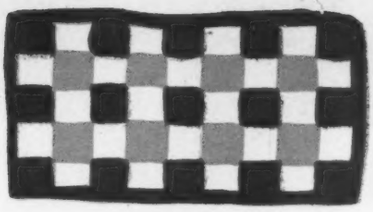
The loom.

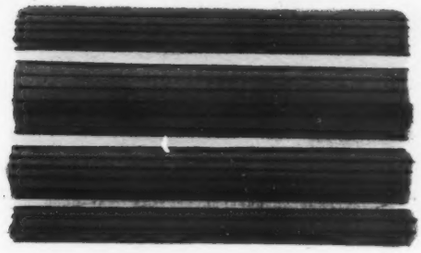


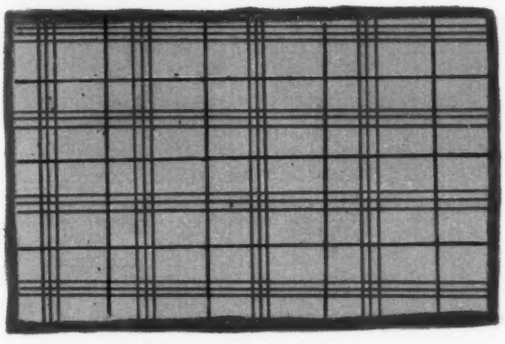
Winding the warp thread.

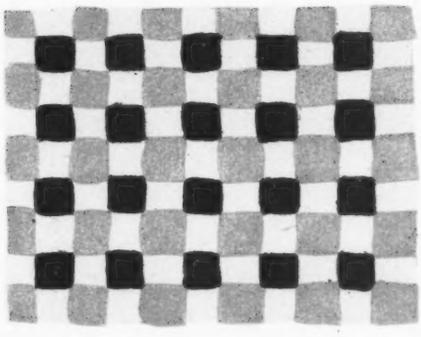
Transferring small coils of Singapore silk thread from one reel to another.

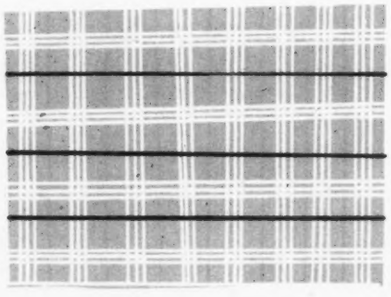
19.—Silk in Burma.

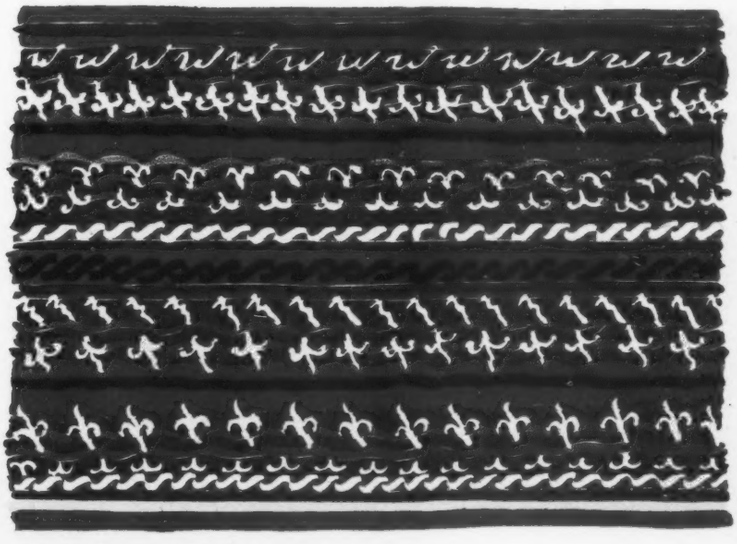


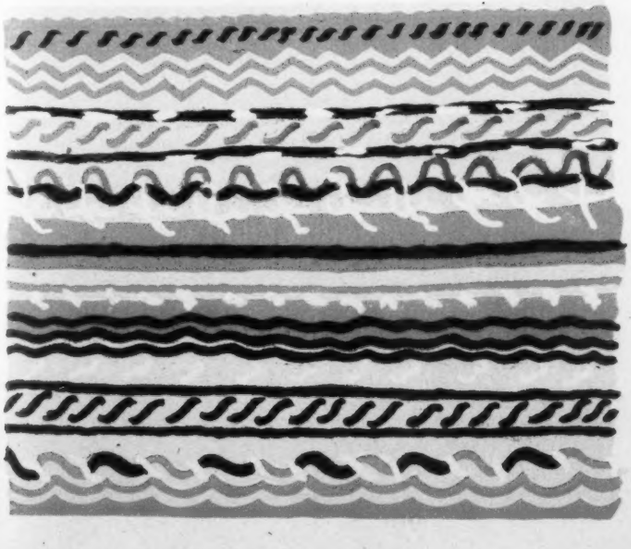


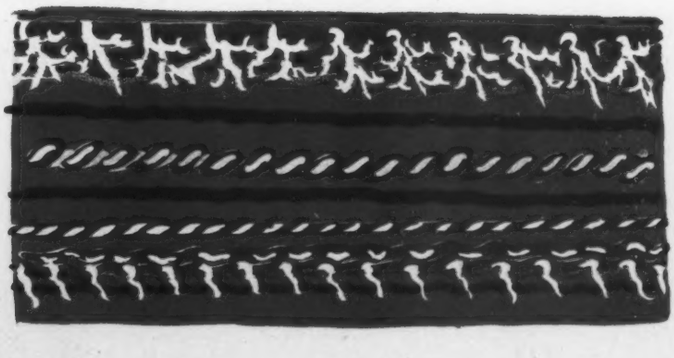






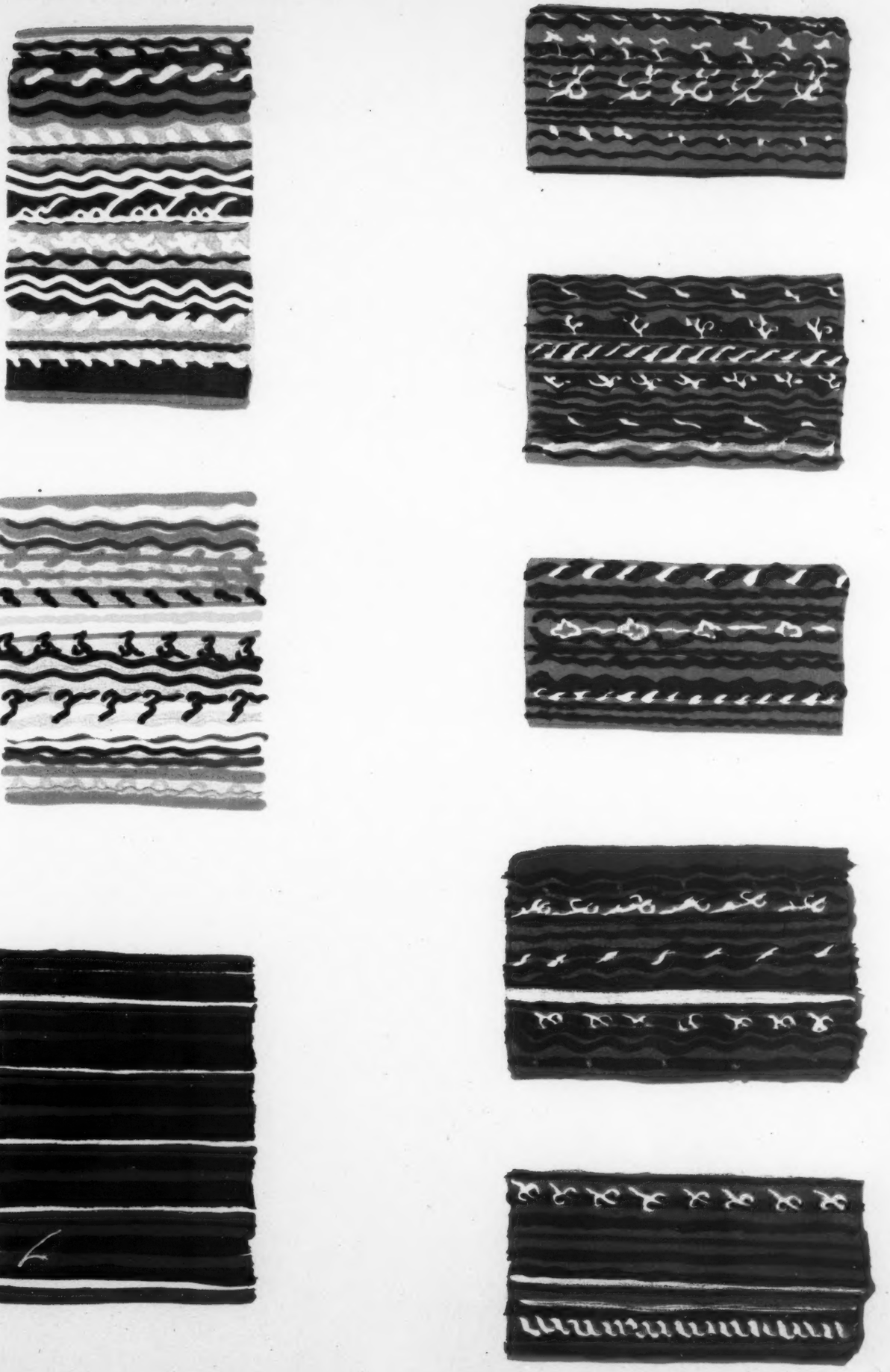






20.—Silk in Burma.

Fabrics.



21.—Silk in Burma.

Fabrics.

The Journal of Indian Art and Industry.

WAZIR KHAN'S MOSQUE, LAHORE.

By FRED. H. ANDREWS, Esq., Late Principal Mayo School of Art, Lahore.

Some years ago a coloured drawing of the exterior of the gateway of the Mosque of Wazir Khan at Lahore was reproduced in this journal,[1] together with one or two pieces of decorative detail to a larger scale and a brief descriptive and historical note by Mr. J. Lockwood Kipling. The object of the present paper is to supplement Mr. Kipling's and to give an adequate idea of the proportions, form and general scheme of decoration of the building as a whole.

It will be seen from the accompanying General Ground Plan (Plate 22) that the Mosque is entered from the Market Place by a short flight of steps leading, by way of a pointed arch, into an octagonal vestibule covered by a fine dome. Unfortunately, the orientation of the building has not been indicated on the plan; it is therefore necessary to explain that the main entrance, under which the scale is drawn, is approximately in the east, with just the variation required to cause the length of the building to point towards Mecca, west by a few degrees south of Lahore.

Extending north and south of the vestibule is a transverse corridor containing small double-roomed apartments and opening at either end into the adjoining bazaars. Passing through the small archway immediately in front, the large quadrangle is reached, wherein the worshippers assemble for prayers, performing their necessary ablutions at the square tank opposite the gateway. At a distance of 130 feet from the entrance, the level of the pavement of the quadrangle is slightly raised, the lower level forming a square whereof the tank occupies the centre. The tomb at the west side of the square is that of Sayad Muhammad Ishaq, *alias* Miran Badshah, a native of Gazrun in Persia, who lived and died in Lahore during the Tughlaq dynasty.

At the western end of the quadrangle and on the raised part of the pavement is the sanctuary (Plate 27), covered by five domes and opening on to the quadrangle by five arches, the centre arch, like the centre dome, being considerably higher than those on either side, and the façade being correspondingly heightened to allow of this. A semi-cupola above the central arch leading into the sanctuary has its springing line at a height of about 20 feet above the ground. From the narrow cornice moulding at this level the sides rise for a few feet perpendicularly before turning rather sharply into a somewhat flattened curve. The vertical sides or "drum" are moulded into narrow pointed arched panels, at the apices of which elaborate pendentive work originates, and lacing upwards, culminates in a small geometrical star in the crown. The arched opening below this semi-cupola leads to the central and highest of the five domes (Plate 24). The central chamber is square in plan, with a double alcove in the wall opposite the entrance. The larger alcove is rectangular in plan, about three feet deep, and is dome-shaped at the top, the transition from rectangle to dome being effected by means of pendentive work (*galub kári*). The inner recess is semi-octagonal in plan and is similarly domed. A rich pendentive cornice, having a total projection of two feet, divides the square of the lower part of the chamber from the octagonal drum. The drum is enriched by eight semi-octagonal alcoves domed similarly to those below; and from these, *galub kári* weaves the web-like transition from octagon to circle, the curved surface of the dome being smooth. To right and left of this central chamber, arches with beautifully panelled soffits open into the adjoining chambers, which again similarly communicate with those at the ends.

The description of the central chamber applies in a general way to the four smaller ones, with the difference that these being less lofty have no cornice, the square of the lower walls mellowing to the smooth circular dome through the medium of *galub kári*. In the crown of these smaller domes there is a shallow bowl-like depression, giving to the section a trefoil form.

At the extreme ends of the sanctuary are placed a few small apartments arranged in two stories, the upper overlooking the end domed chambers, and that on the north side also overlooking the bazaar.

It will be seen from the section through the sanctuary given on Plate 24, that all the domes are double. This arrangement, usual with the Moghal builders as with many masters of the Roman Renaissance, although perhaps not quite academic, has the advantage of permitting unhampered the employment of the most harmonious forms for the interior and exterior aspects respectively, and probably this was the motive actuating the architect. Incidentally it also gives greater protection from the heat of the sun.

Right and left of the façade of the sanctuary, are two stately octagonal minars 100 feet in height. On the long sides of the quadrangle (Plate 25) are ranged small *khánas* or cells, each closed by the usual Indian two-leaved door, set

[1] *The Journal of Indian Art*, No. 19, July 1887.

in a slightly recessed pointed arch, of which there are thirteen on each side, forming a blind arcading, interrupted between the fifth and sixth *khánas* on each side by a pavilion rising above the general level, containing larger apartments and an upper storey reached by two flights of steps, which also give access to the roof of the arcading and pavilions. As the plan shows, these pavilions occur in the centre of the north and south sides of the lower level of the pavement. In the pavilion on the south side is a fountain set in a circular scalloped basin, and served from the main which supplies the tank in the quadrangle. The source of the water supply is a well provided with an elevated Persian wheel placed just outside the south wall of the mosque.

Returning to the eastern end of the quadrangle,—two minars similar to those already referred to rise from the north and south angles (Plate 23). The vestibule building stands centrally between these, on the eastern end, the intervening spaces being occupied by three *khánas* on each side. On each of the angles of the vestibule building overlooking the quadrangle is a square turret with a kiosk at the top, the three open arches at each face having narrow horizontal *pinjra* parapets, and broad overhanging eaves carried on characteristic brackets; and above, a hemispherical cupola raised upon a high drum, and furnished with an ornamental finial. Winding stairways in the turrets lead to the kiosks, and to the galleries and chambers looking down upon the quadrangle, the vestibule and the market place.

The material used in the construction of the Mosque is a small tile-like brick universally used by the Moghals when stone was unobtainable or too costly. The only stone in the building is used for brackets and some of the fretwork (*pinjra*). The walls were coated with plaster (*chunam*) and faced with a finely-sifted quality of the same material tooled to a marble-like surface and coloured. All the external plaster work was coloured a rich Indian red, in true fresco, and the surface afterwards picked out with white lines in the similitude of the small bricks beneath. The extreme severity of the lines of the building is relieved by the division of the surfaces into slightly sunk rectangular panels, alternately vertical and horizontal, the vertical panels having usually an inner panel with arched head, or the more florid cusped *mihráb*. These panels, where they are exposed to the weather, are generally filled with a peculiar inlaid *faience* pottery called *káshi*, the effect of which must have been very fine when the setting of deep red plaster of the walls was intact. The origin of this variety of *káshi* in the Punjab seems obscure and the method of manufacture uncertain. It differs from that usually used in Persia, in that the several colours are cut to shape, in the manner of the coloured glass in a stained glass window, and are then embedded in a matrix of mortar. It has been suggested that the paste composing the body of the pieces was cut to shape and glazed in proper colour before firing. My friend Rai Bahadur Ganga Ram, C.I.E., M.I.C.E., &c., Executive Engineer of the Lahore District, and I, conducted independent experiments with a view to elucidating this point. He proceeded to cut the shapes before firing, while I had slabs of coloured pottery glazed and fired, afterwards cutting the shapes as an English tile-fixer does. The results seemed to favour my method, which gave a crisp clean edge to each piece as against the other, in which the edges were rounded and slightly bulged. But, whatever the method employed, the effect of much of the Moghal work is extremely fine, particularly when the bright mustard yellow is not too lavishly used. The secret of the art is said to have died with an aged *karigar*, Muhammad Bakhsh, who expired at Lahore in 1876 under the weight of ninety-seven years, having never in all that time consented to take a pupil.

At the present time, the walls being almost entirely stripped of their *chunam* coat, exhibiting weather-worn bricks, the brilliant unchanged colours of the *faience* assert themselves somewhat harshly. With the minars, however, the façade of the sanctuary, and the entrance gateway, where a very small portion of the surface was left for plaster, the effect of the gorgeous colours against the soft blue of a Punjab sky, and saturated with brilliant sunlight and glowing purple shadow, is indescribably rich and jewel-like. Round the lower walls of the quadrangle, *káshi* work is introduced along the parapet in a fine *madákhal* pattern; in the spandrils of the pointed arches surrounding the doorways and of the small panels between these, and in a horizontal rectangular panel over each door. It is one of these last that has been selected for reproduction in Plate 29.

The façade of the sanctuary is practically covered with *káshi* and is divided into the usual oblong panels. A beautiful border is carried rectangularly round the centre archway, and inscriptions in Persian characters occur in an outer border, in a long panel over the archway, and in horizontal panels along the upper portions of the lower walls to right and left. The spandrils are filled in with extremely fine designs. A *madákhal* pattern runs along the parapet of this façade, up the sides of the heightened central portion and round the lower gallery of the minars. The two lower panels right and left of the central archway bear inscriptions, as do also the two panels on each side between the smaller arches.

The decorative work covering the western elevation of the vestibule building is shown in the coloured Plate 28, and in this the beautiful treatment of the small domes over the kiosks deserves attention.

The design of the minars is particularly good. The division of the height into its several parts is most admirable. From above the parapet of the square, strong base rises the octagonal shaft—the change from square to octagon giving a degree of lightness, while the division of the surface into rectangular panels suggests rigidity. Again the shaft rises from above a dividing band of geometrical pattern and, still preserving its octagonal section, is cleverly divided into sixteen narrow-pointed panels, from the heads of which spring a most graceful tracery of *galub kári* or pendentive work drooping gently outward to carry the gallery with richly coloured borders and *pinjra* parapet. From the gallery rises an elegant kiosk with sloping eaves supporting first an octagonal drum, and above this a circular one which curves slightly outwards to support the pointed and ribbed dome with its lotus finial.

The internal decoration is extremely rich and elaborate and is executed in fresco on an exquisitely fine *chunam* surface. The painting demanding first attention is that covering the internal walls and cupolas of the sanctuary. Round the lower part of all these walls runs a dado four feet in height, of arabesque design, usually surrounded at each change of surface-level by a gracefully flowing floral border and narrow bands of plain colour. Monotony is avoided by frequent variation in the arabesque patterns, and while all are characterised by grace and admirable discretion, one pattern is particularly fine. The field is deep ochre ("old gold") with a bold strapping superposed in rich red, relieved at each edge by a white line, which is again divided from the field by a fine black line. At certain points where the strapping interlaces it passes through cartouches of pale neutral blue relieved by white and black lines in the same manner as is the strapping. Simple leaves and flowers trail gracefully along the straps; and garlands on the blue cartouches encircle the intersections, passing over and under. The deep yellow field appearing as beautifully shaped panels beneath the plane of the strap work, bears pink naturalistic iris plants, and conventional rose-like flowers with leaves. The floral border is in naturalistic colours on a deep purple-brown ground, and is divided from the filling by narrow bands of pink and green, with white lines between. Many of the white lines in borders and strapping are drawn in sgraffito, and so are saved from any possibility of crudeness.

Above the dado, the walls are divided into rectangular panels alternately horizontal and vertical, the vertical ones having the cusped Persian *mihráb* shape painted within them, and those which are horizontal having both ends similarly shaped. The spandrils so formed, are usually in deep colouring—dark red or blue or other rich ground, with conventional flowing patterns of flowers and leaves in naturalistic tints. The field of the upright panels usually bears a finely drawn, gracefully growing flower, or group of flowers (remarkably like the full-page illustrations in the old folio Italian Herbals) issuing from conventionally indicated grassy ground or from a very Chinese *martobán* or vase. Wherever the *martobán* is used, it is treated as though copied from blue and white pottery, and is generally standing in a kind of *chilamchi* or bowl, with a thin stem. The leaves and flowers are tinted in quasi-natural colours, with a certain amount of shading and variety of tone, and are always freely outlined and "fibred" with black. On the background frequently float Persian clouds.

The variety of flowers introduced into these designs, and the appreciation and *verve* with which they are drawn is remarkable, and shows what lovers of flowers the Moghals were. One sees this, too, constantly expressed in their illuminated books, in their landscape and garden subjects occuring in domestic mural paintings, and more particularly in the elaborately constructed flower-beds in their *bághs* and around their tombs.

The horizontal panels are always treated more conventionally and give a pleasing contrast to the others. The spandrils over the alcove and arches in the central chamber are filled with conventional scroll-work having for centre a "*suraj mukhi*" or sunflower.

Above the rectangular panelling in the centre chamber and just beneath the pendentive cornice is a long quotation in Persian running in two lines round the four walls. The cornice is richly coloured and so are the pointed arches and panels above. The *galub kári* is exquisitely decorated, and by the selection of groups and bands of the small concave facets for combined treatment, constructive masses are slightly emphasized and possible incoherence (with which Rosengarten would appear to charge this feature) avoided.

The cupolas are divided into gracefully designed panels, in which the balance of rich and delicate colouring is most admirably preserved, and the applicability or fitness of the enrichment never ignored. The beauty of the panelling is well shown in the right half of Plate 28, and the balance of colour, approximately, in the opposite half. The effect of the decoration of these cupolas and walls in the soft warm glow of the light reflected from the sun-lit pavement without is very beautiful, strongly suggesting tapestry. The pavement within the sanctuary was probably covered with an extremely hard, deep, maroon-coloured cement, and in the early part of the day, when the sun strikes under the arches, this would have lent an added richness to the colour within; but, as the heat of the day increases, the reflection draws gradually away, permitting cooler tones to soothe the heated bodies of those who seek shade and peace within the sacred precincts. To an artistic temperament there is a wonderful

fascination in watching the great shadows, towards evening, quenching the glowing sunlight as they glide over the quadrangle. The cool band projected by the tall south-west minar, stretches out over the pavement and meeting the circumscribing wall, bends up and presently over it, to be broken into fantastic shapes as it makes its way across the endless expanse of terraced house-tops of the city. When the broad shadow of the sanctuary façade, steadily pursuing but ever losing ground, steeps the base of the opposite minar in purple grey, the *káshi* jewels high above glint in the ruddy light of the sinking sun like the scintillations of a glorious opal. Then as the mournful cry to prayers swells out throbbing over the seething bazaars, and good Muhammadans begin to enter barefooted at the low archway, one feels that it is only where the sun is most fearsome that its potency can provide such a background, and that the most picturesque human conceptions can find such fitting concrete expression.

To many who have visited this Mosque it has been a cause of surprise that there should be, here and there, such a strong Chinese character associated with the otherwise Persian style of the decoration. When we consider that this work was probably executed by craftsmen from Persia, or at least under direct Persian influence, and that for many years Persian potters had found it profitable to execute forgeries of Chinese porcelain—even to the inscriptions and potters' marks—for export to Europe where it found a ready sale as genuine, it is not difficult to realize that elements of Chinese design were almost bound to occur, and more particularly in such details as flower vases.

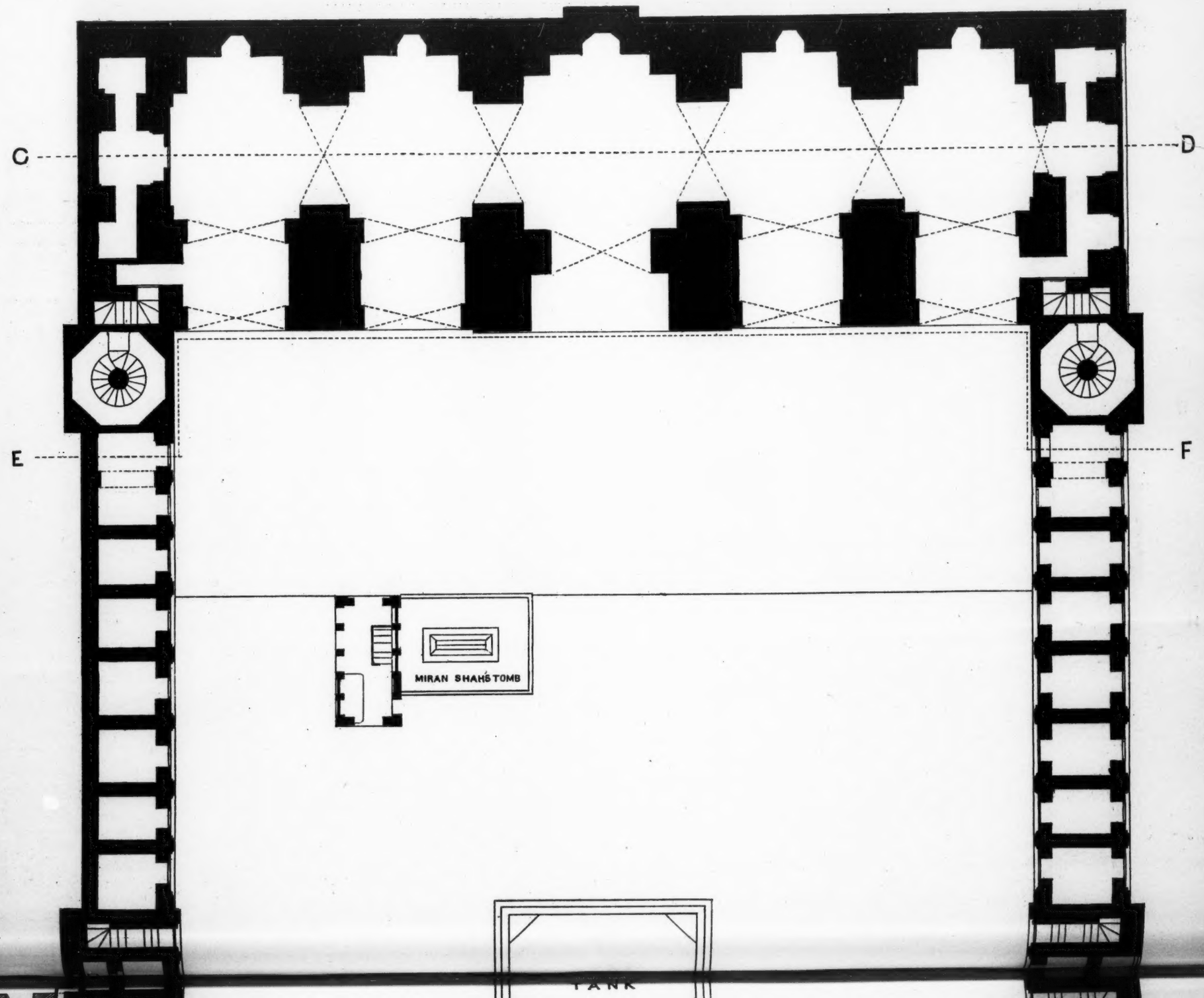
At the time of my last visit to the Mosque, the plaster facing of the inside walls was in a state of considerable disrepair, and perhaps well-meant but crude attempts to arrest destruction had resulted in unsightly scars of inferior and uncoloured plaster, which, however, was better than some of the more ambitious efforts of a later date (if the almost incredible statement be true) where misguided zeal caused the red sandstone of a famous tomb to be colour-washed pink! If the founder of the Mosque—Sheikh Ilm-ud-din *alias* Wazir Khan, son of Sheikh Abdul Latif, son of Sheikh Hisam-ud-din—should in spirit visit his final and most beautiful "endowment to poor Mussalmans," he would be saddened to find how little regard his human beneficiaries had shown to the solemn injunctions of his deed of bequest, and how mutable is real estate in this world, howsoever carefully our last directions may be set forth. For in his earnest desire to perpetuate this memorial—"to give permanency to this sacred Institution"—he says: "I have endowed for its expenses all the shops and houses on either side of the street from the Masjid to the Delhi Gate," and a certain serai and hammám, for the proper upkeep of the Mosque and support of the establishment connected with it. "The legacy is valid, binding, certain and imperative . . . under no circumstances to become the property of anyone until the day when God shall assume heritage of all lands, for he is best of inheritors. . . ." This is dated 1051 Hijri. But, alas! Sayad Muhammad Latif tells us that the serai and baths no longer contribute towards the original object and all the other parts of the estate, save the few shops actually included in the building of the Mosque, have become private property.

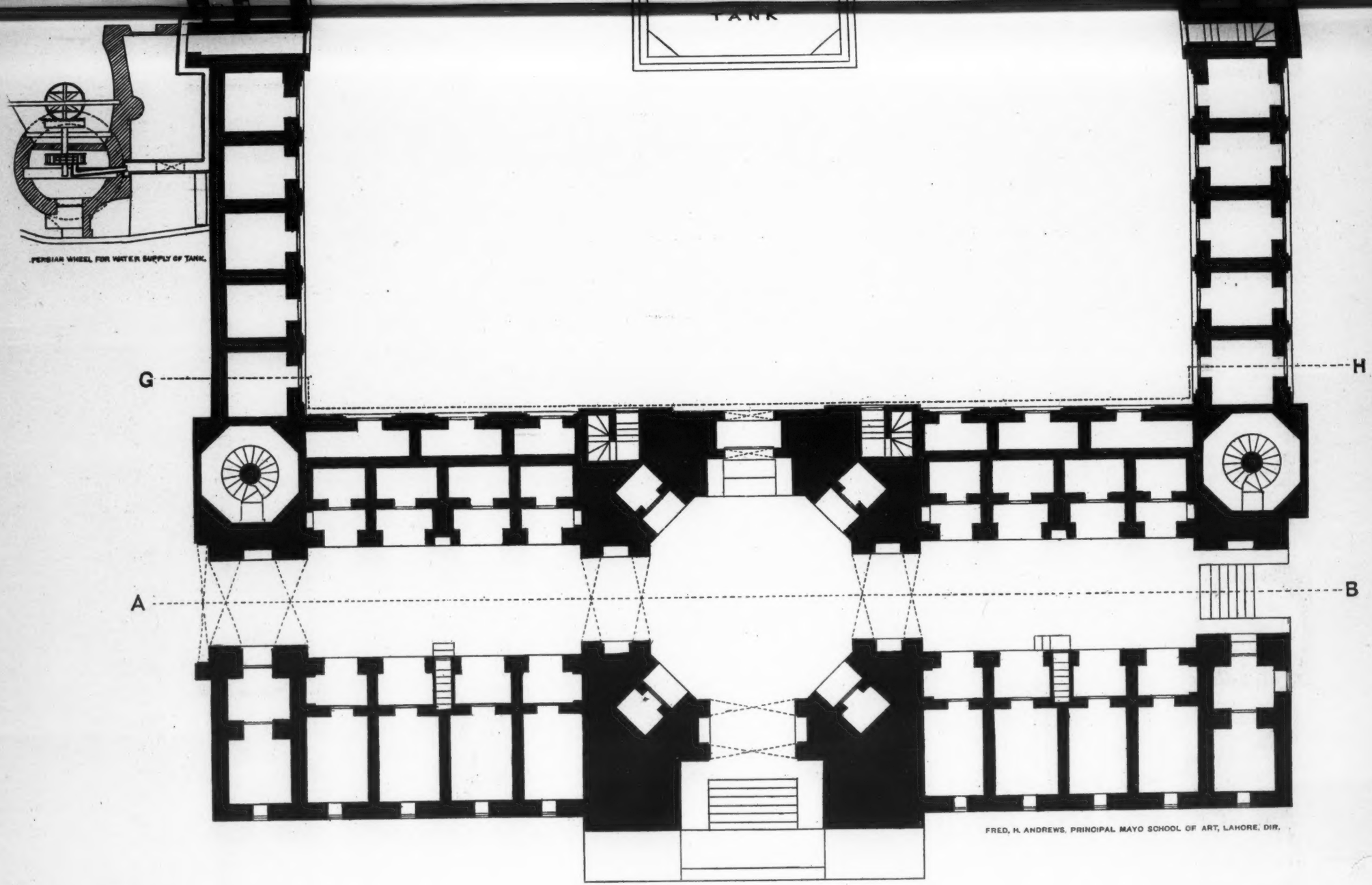
The accompanying plates are from drawings executed by students in the Mayo School of Art, from careful measurements, as part of their practical training.

LIST OF ILLUSTRATIONS.

22. General Ground Plan. 23. Elevation on G.H. 24. Section on C.D. 25. Longitudinal Section. 26. North Side Elevation. 27. Elevation on E.F. 28. Interior, East Elevation. 29. Panel.

The scales given as 1 in. should be ½ in.


C
D
E
F
MIRAN SHAHS TOMB
TANK

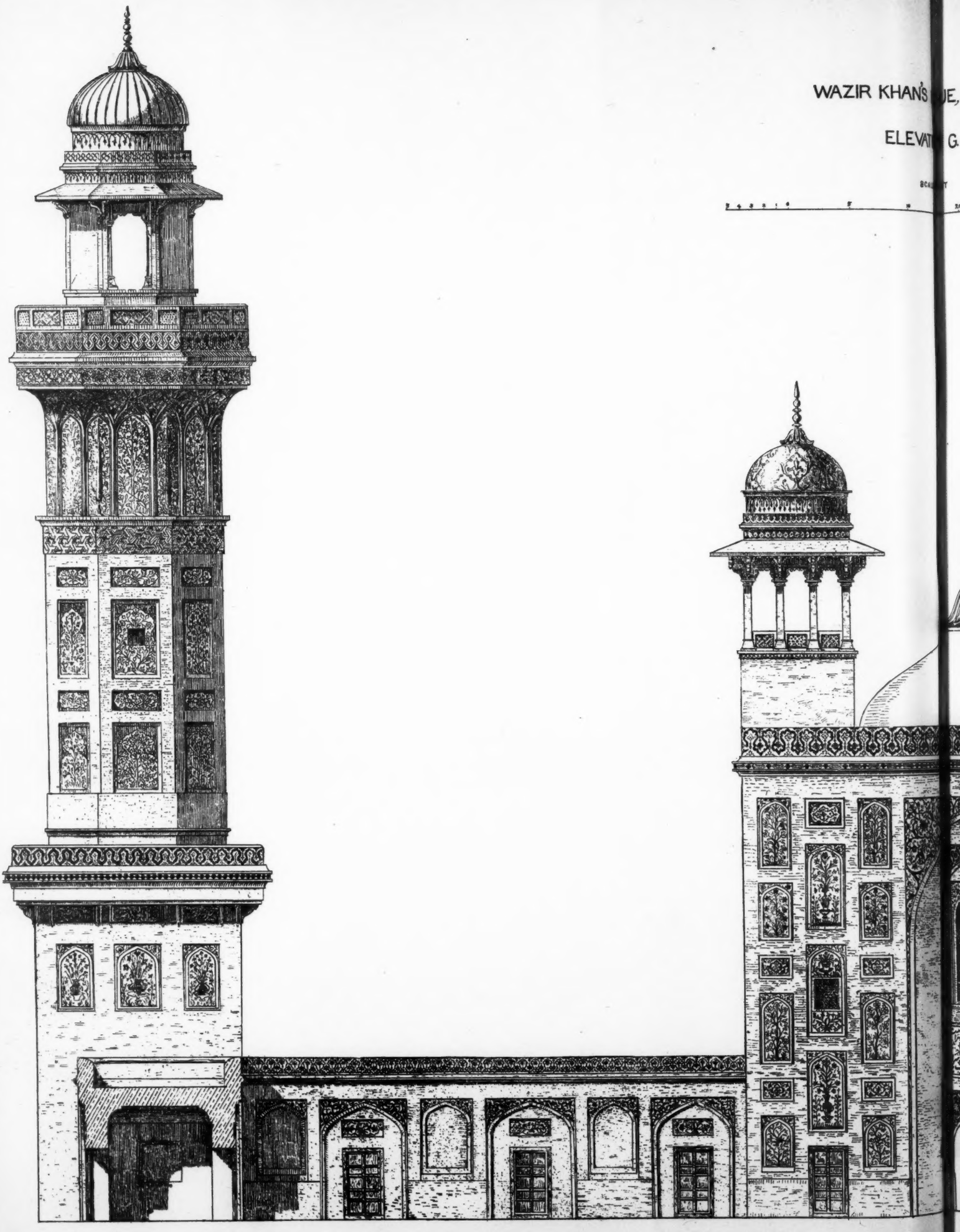


GENERAL GROUND PLAN OF WAZIR KHAN'S MOSQUE, LAHORE.

SCALE 1 INCH = 10 FEET

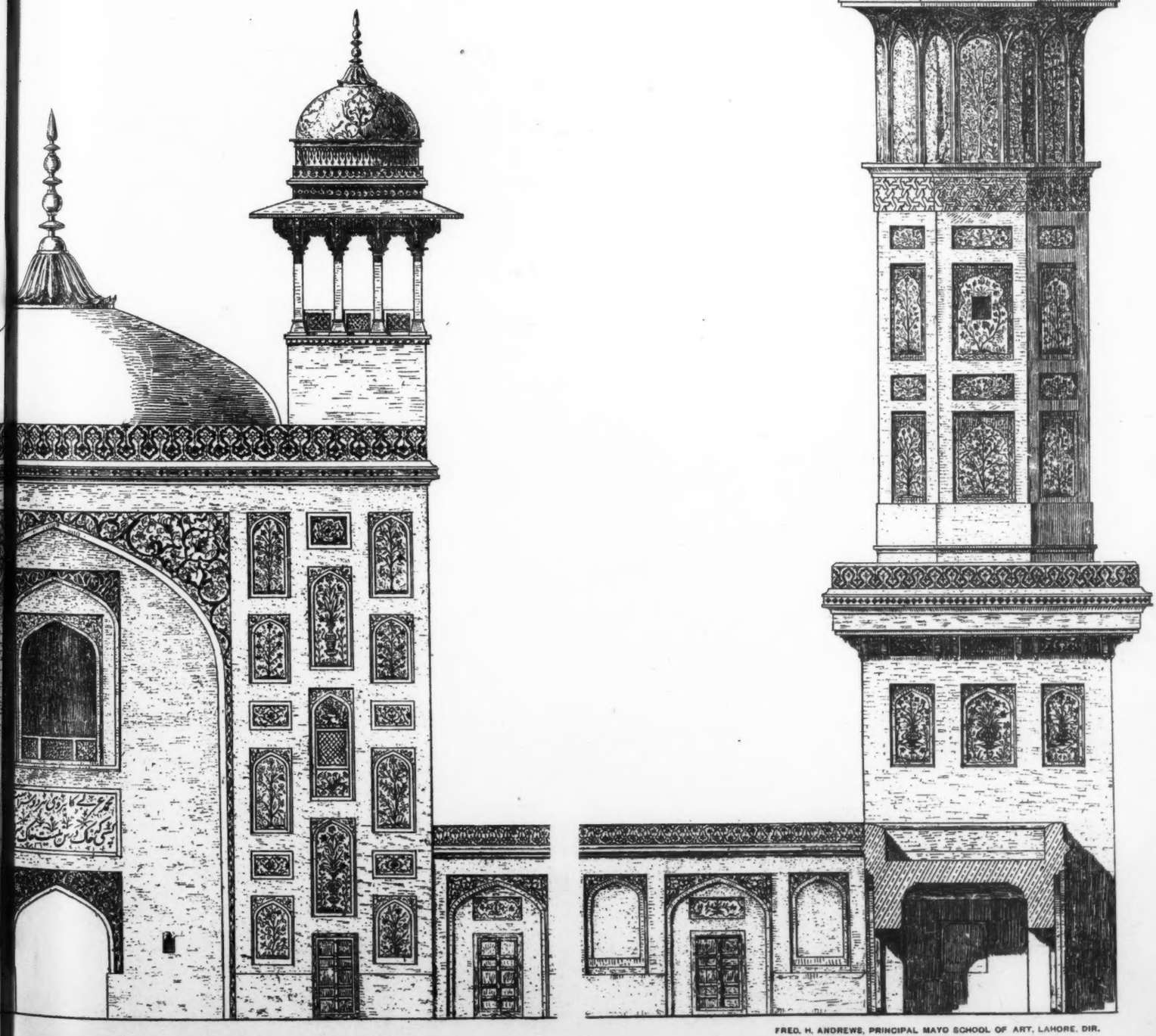
WAZIR KHAN'S [illegible]E,

ELEVAT[illegible] G.



E, LAHORE.

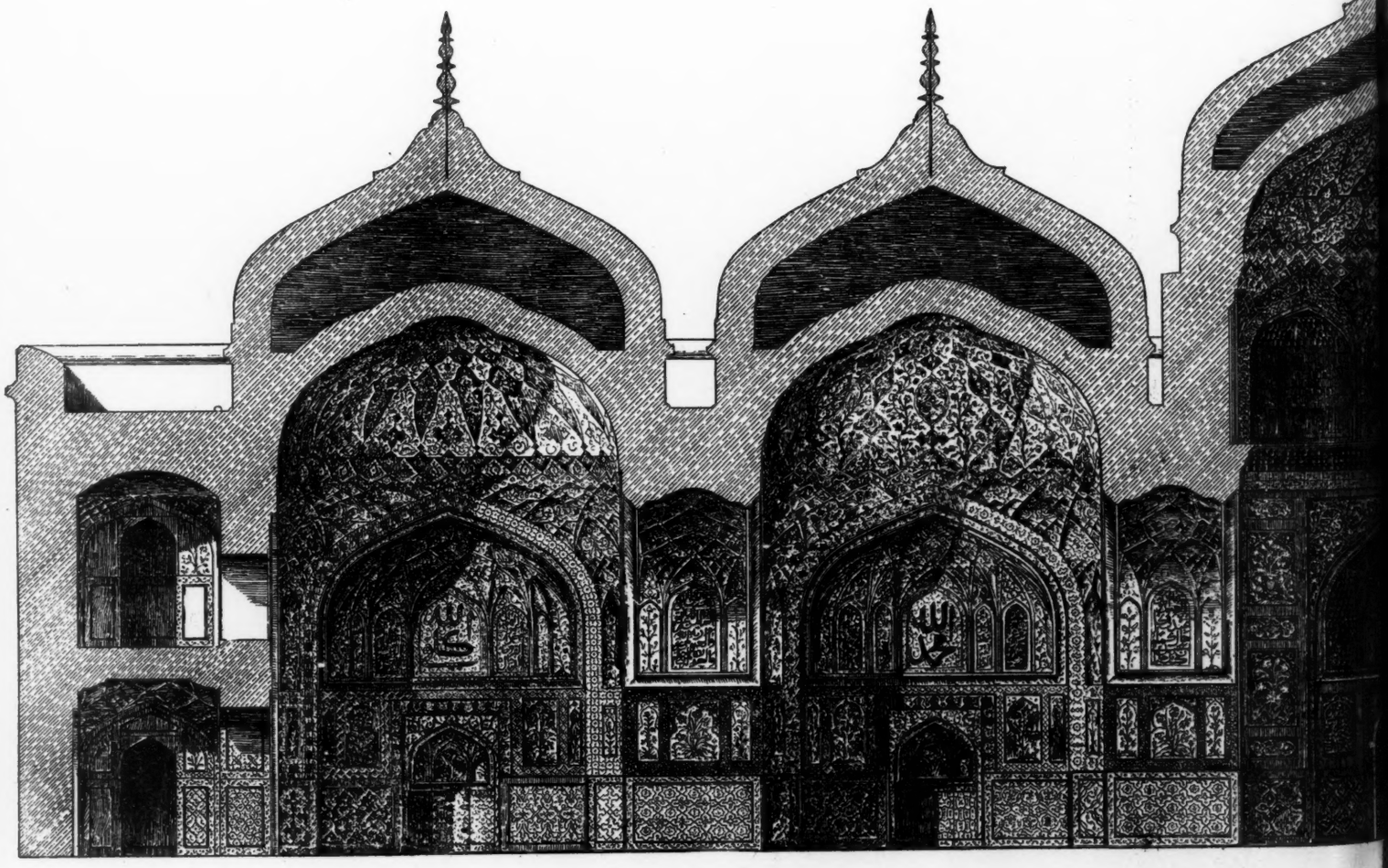
G.H.



FREO. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE. DIR.

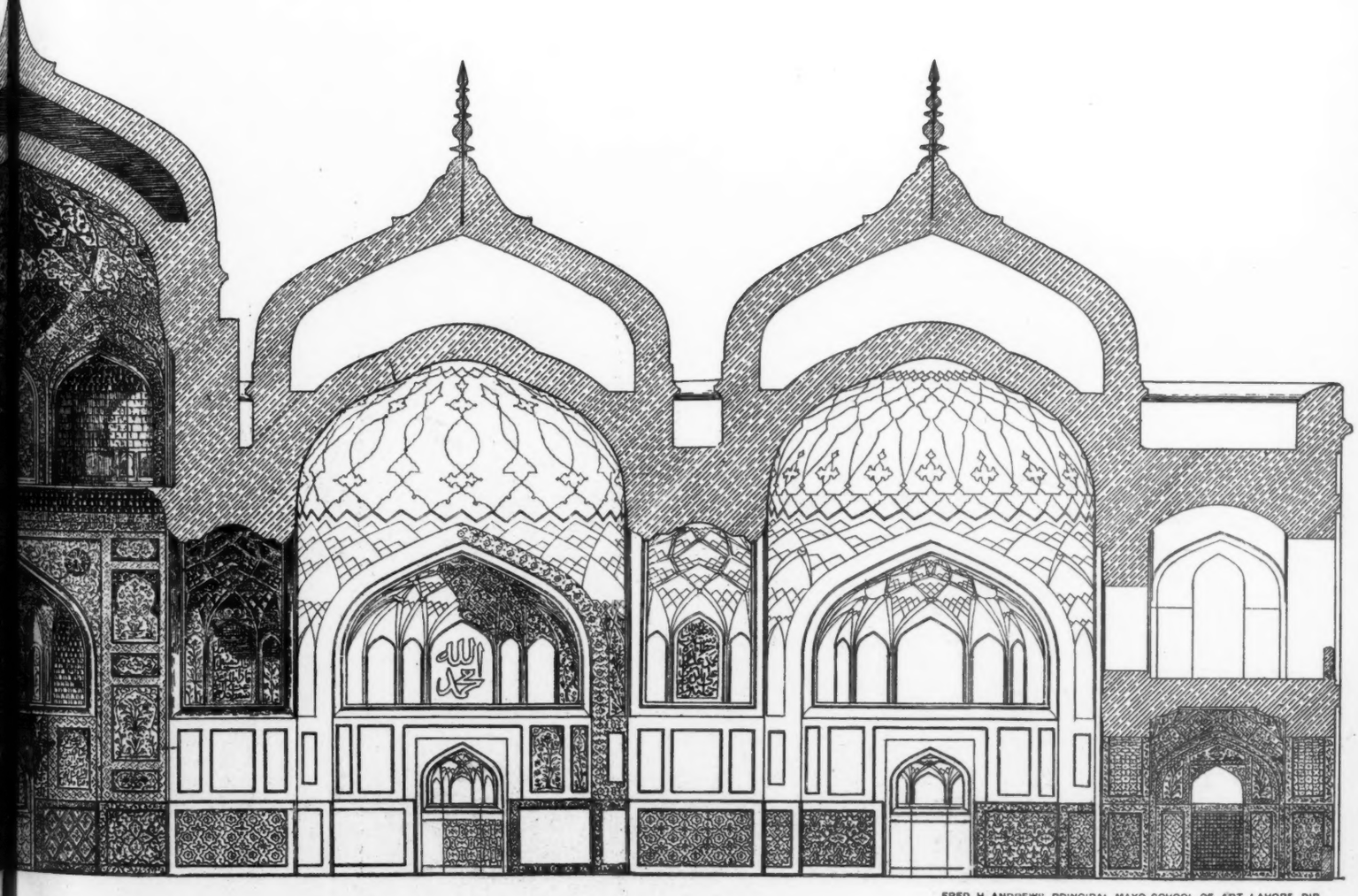
WAZIR KHAN'S MO

SECTION

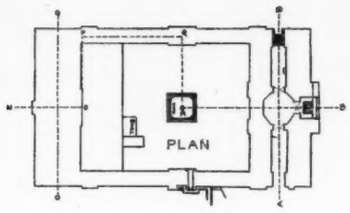


SQUE LAHORE

ON C.D.



FRED. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE, DIR.



WAZIR KHAN'S

LONGITUDINAL SEC

S.

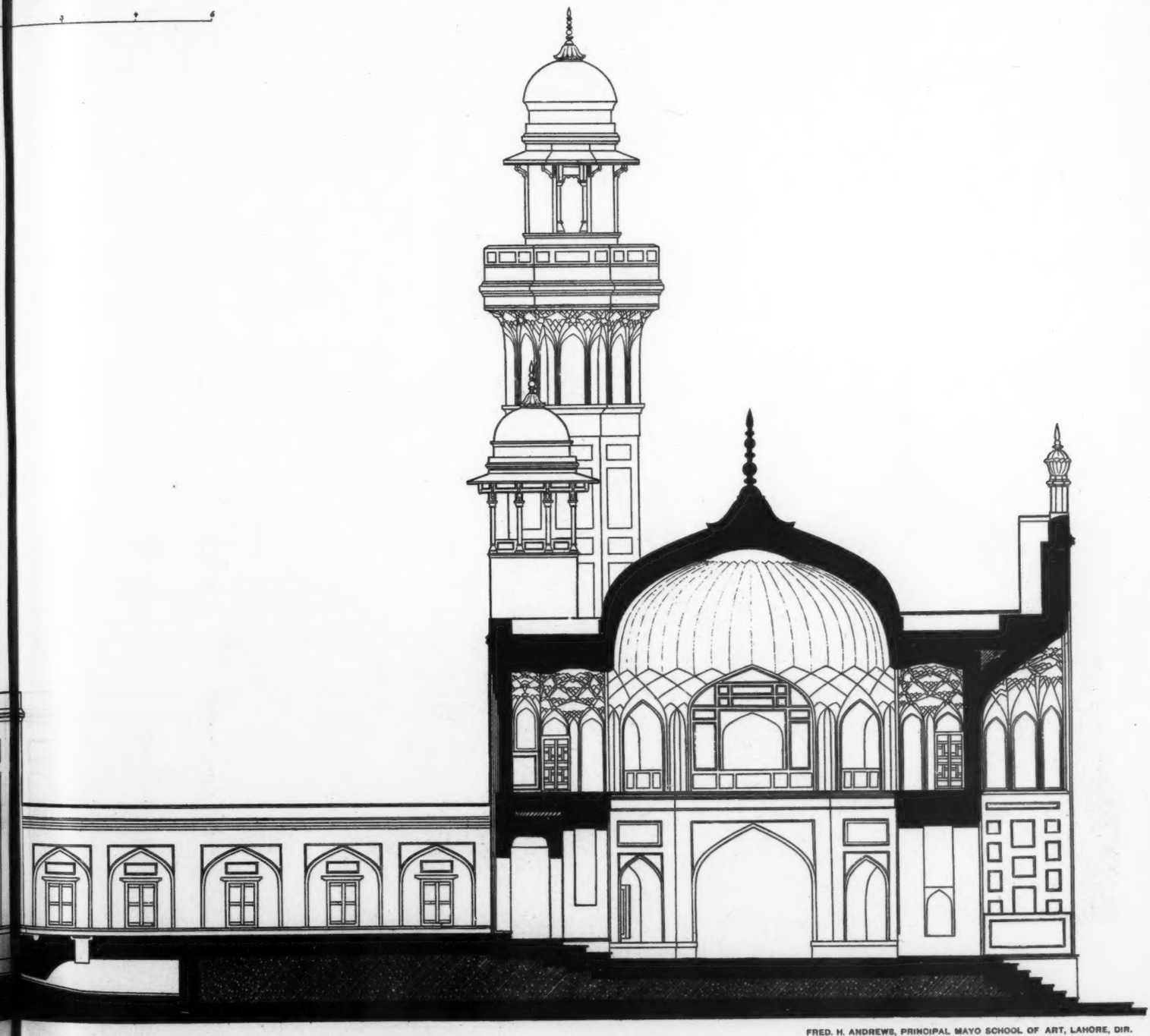
SCALE OF FEET TO

OSQUE LAHORE

ECTION ON LINE

S.

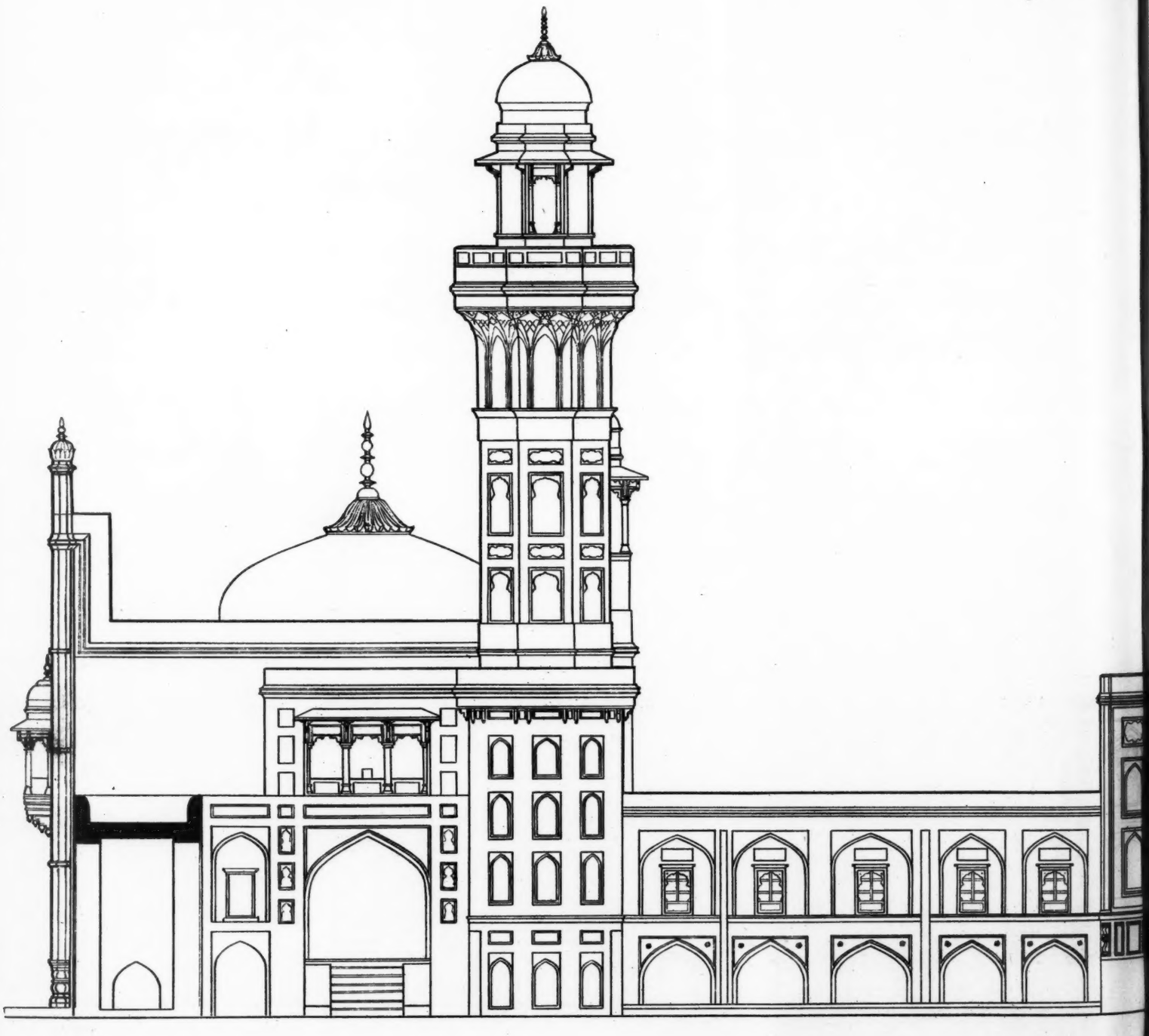
TO EIGHT FEET.



FRED. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE, DIR.

WAZIR KHA

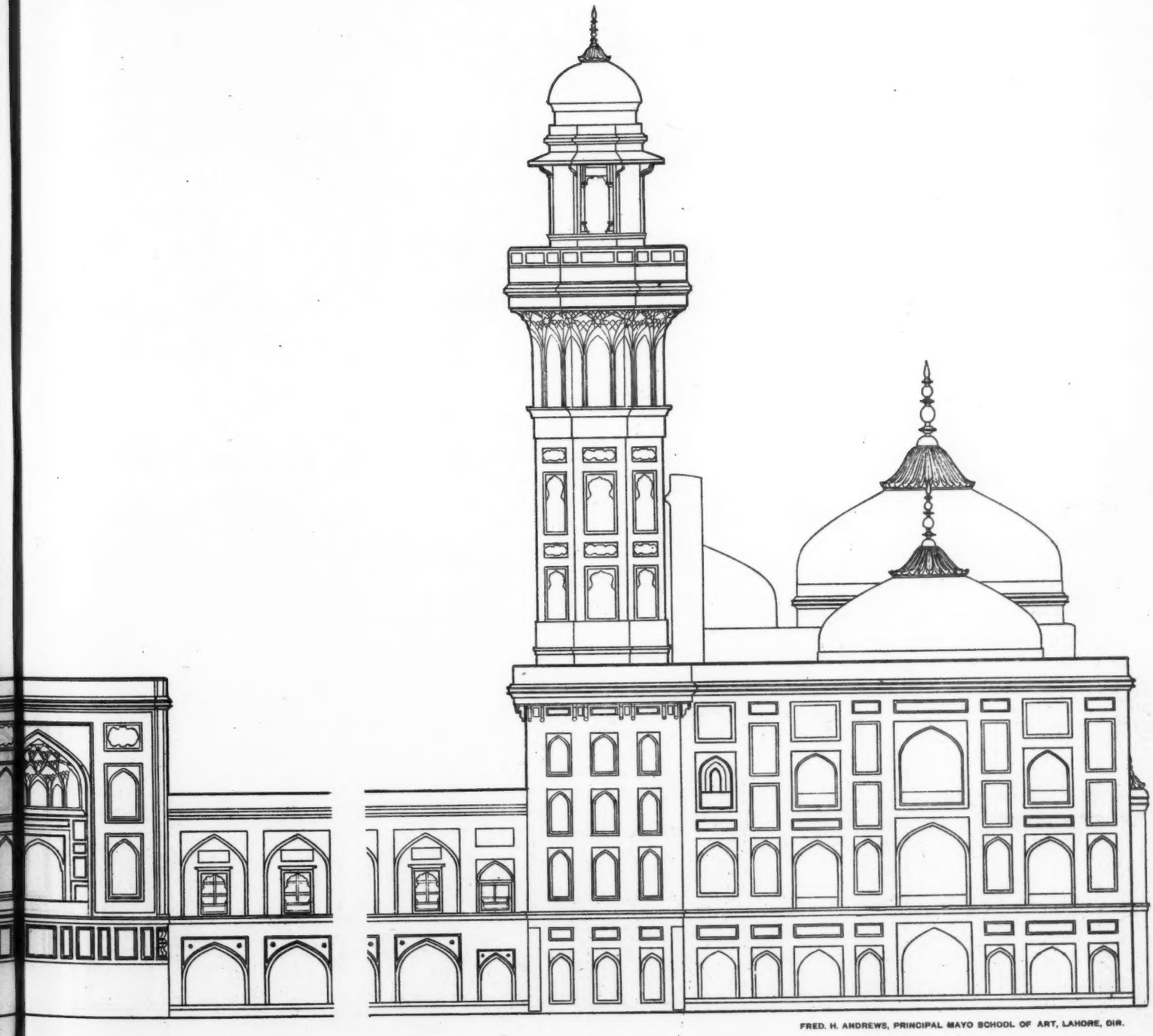
NORTH



MOSQUE LAHORE

E ELEVATION

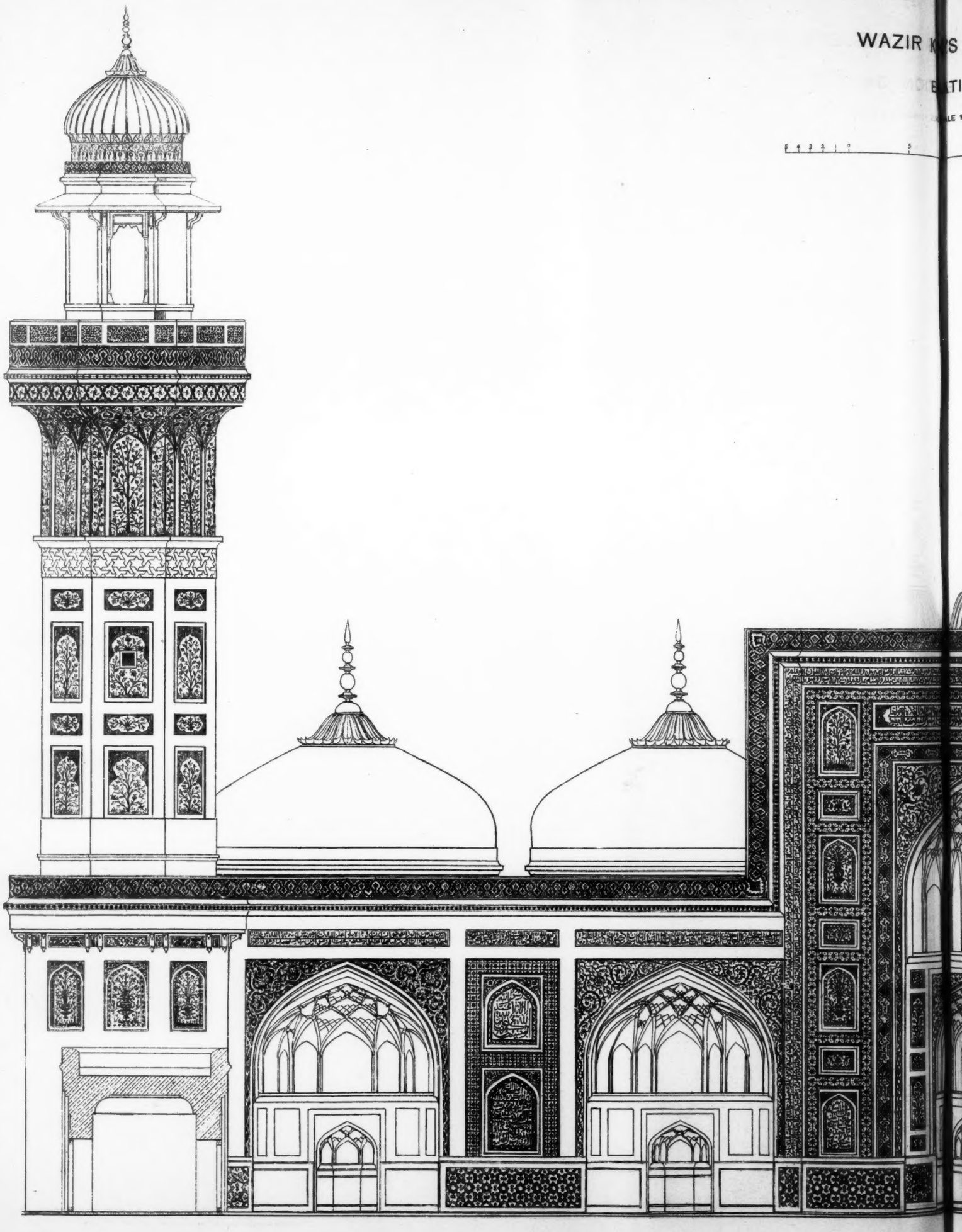
INCH TO EIGHT FEET



FRED. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE, DIR.

WAZIR K S

E TI

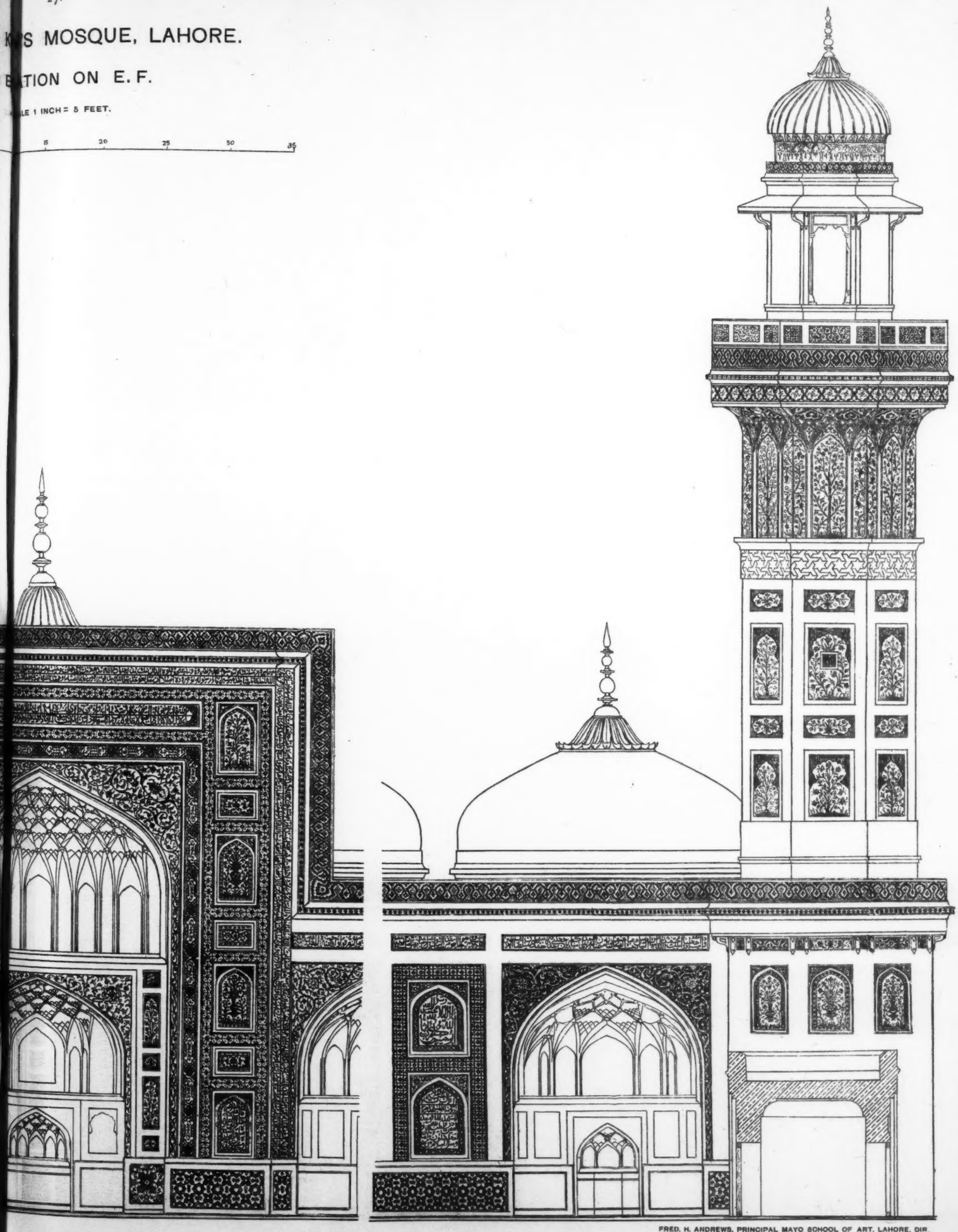


K[illegible]S MOSQUE, LAHORE.

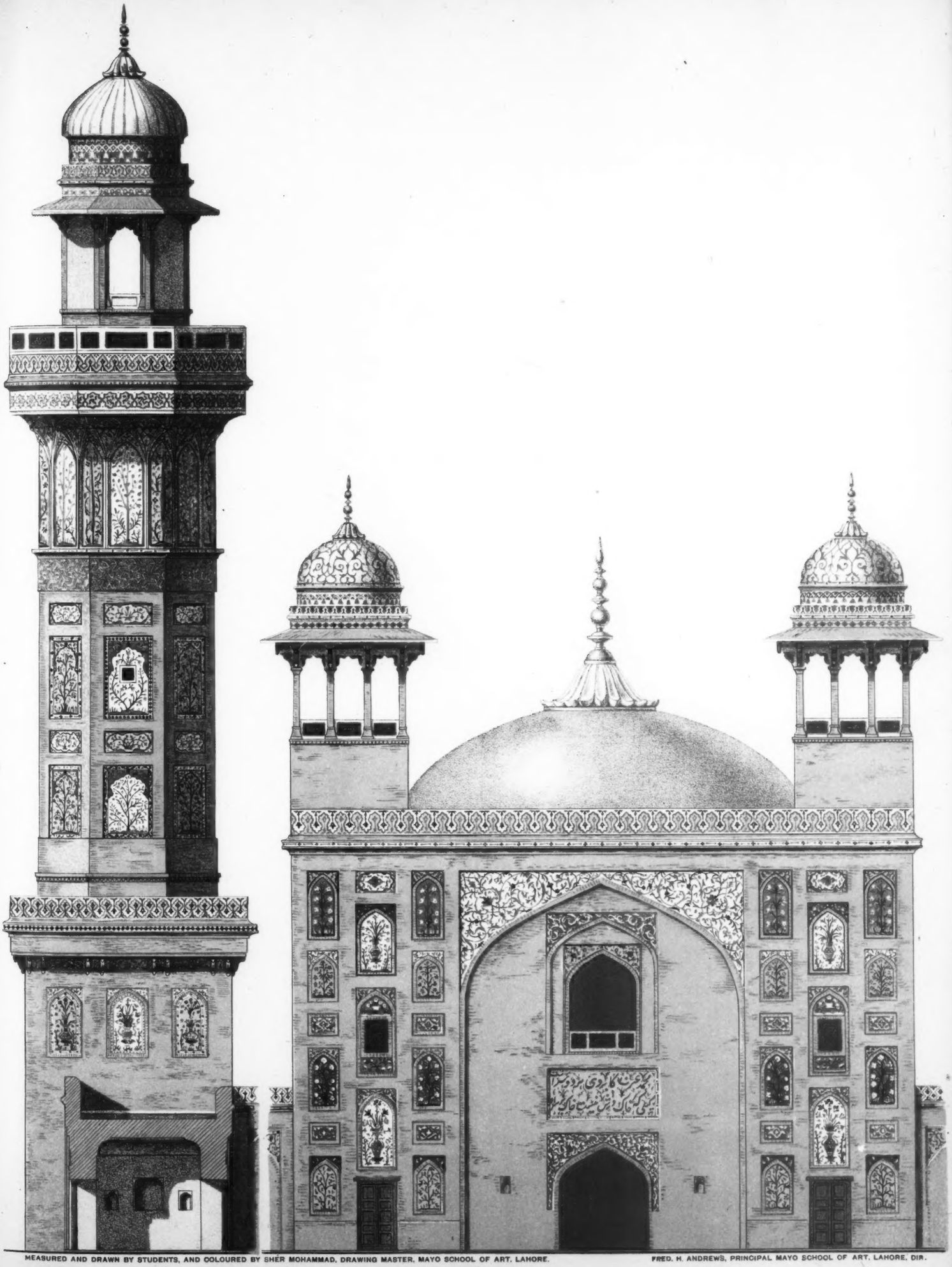
E[illegible]TION ON E. F.

[illegible]LE 1 INCH = 5 FEET.

0 5 10 15 20 25 30 35



FRED. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE, DIR.



MEASURED AND DRAWN BY STUDENTS, AND COLOURED BY SHER MOHAMMAD, DRAWING MASTER, MAYO SCHOOL OF ART, LAHORE.

FRED. H. ANDREWS, PRINCIPAL MAYO SCHOOL OF ART, LAHORE, DIR.

28.

WAZIR KHAN'S MOSQUE, LAHORE.

Interior, East Elevation.

29.

WAZIR KHAN'S MOSQUE, LAHORE.

Panel.

The Journal of Indian Art and Industry.

THE SILVERWORK OF BURMA.

By HARRY L. TILLY, Esq.

There are perhaps few countries in the world in which the use of gold and silver is prohibited in ceremonial worship, and fewer still in which there is no religious service conducted by priests. Yet such is the case in Burma where the monks who follow the strict precepts of their Lord Gaudama are forbidden to touch gold or silver, and beyond expounding the law of their great teacher, do not preside over any religious exercises nor do they assist at a marriage or perform any last offices over the remains of the being who has quitted this scene of trial. The silversmiths of Burma, therefore, have never been called on to make praying-wheels or censers or incense-burners as in some other Buddhist countries, nor has their art developed by the experience of generations in the design and execution of chalices, crucifixes, croziers, of reliquaries and shrines, as in Christian countries. And until the last fifty years or so their field of work was still further limited by sumptuary laws which, wherever the authority of the Burmese Government was sufficiently powerful, denied to any but those of royal blood the use of gold or silver vessels. As a set-off to these limitations there was the patronage of the King and the Court, and much gold plate was made both for the personal use of the monarch and for gifts to be presented on special occasions. Silver bowls, betel boxes and drinking cups were in common use in the palace and no doubt were also used by powerful and wealthy people who were for one reason or another able to evade or over-ride the sumptuary regulations.

With the gradual extension of the rule of the British, has followed freedom from restriction and greater security of property, while display no longer exposes the imprudent to the exactions of their rulers, and consequently well-to-do Burmans are generally the possessors of two or three silver bowls and drinking cups, and it is not uncommon to find minute silver bowls in the trays of the betel boxes of quite poor people. The Burmese are, however, still simple in their tastes, and much plate is not found in any village or small town; but what there is may always be borrowed for a festival, such as the assumption of the yellow robe by a son or the boring of the ears of a daughter. On these occasions all the neighbours are invited and contribute towards the feast, either in money or in kind.

The ceremony of taking the yellow robe by a Buddhist corresponds to confirmation in a Christian church, and in each case the vows to live a pure life are taken at about the same age. To the Burman boy each of the prescribed acts on that day is significant and reminds him of the great renunciation of Gaudama Buddha. He is dressed as a prince and is led forth through the streets of his native place sheltered by royal umbrellas and accompanied by shouting companions, and when he returns to his old home he finds it transformed, as far as the means of his people will allow, into a palace filled with fair young girls dressed in the gayest silks, laughing and joking beneath bright canopies edged with white cloth cut into fairy-like lace. There is much feasting and the food itself is out of the ordinary, while even water and betel-nut are served in silver. All this is in honour of the boy, but he looks beyond to the end of the room where, on a raised dais, behind large fans, sit the monks in their yellow robes, and he hastens to prostrate himself, remembering that he must give up all these things even as did the Lord Gaudama. He takes the vows of poverty and austerity, his head is shaved and his clothes are thrown aside and exchanged for a mendicant's garments, and he humbly follows his teacher to the quiet monastery, to stay there for the rest of his life, or for a couple of months, according to his vocation. And so with all the festivals of the Burmese,—gay colours, white jackets, a little silverware, laughing girls, young men full of the pride of life, the old looking on with tolerant eyes, and in the background the monastery calling to mind the weighment of merit against demerit in the working out of the inexorable law of existence.

It is not surprising then that the Burmese silversmith has little variety of shape to show his European customers, and does not succeed particularly well in making teapots, race cups and other things, which he and his have never used. But on the squat forms of bowl or betel box his fancy depicts the immortal stories of the past—stories many of them taken from the ancient treasure-house of India; such as the Ramayana, which to the Burman recounts the adventures of Gaudama in one of his previous existences. There are ten such principal legends, and to each of the characters is assigned by tradition a precise costume and particular ornaments; nay more, the very attitudes are in many instances prescribed, and of the many demons, ogres and guardian spirits who continually appear throughout the stories to thwart or aid the hero, each one may at once be recognized by its action or emblem. Besides bowls, drinking cups and betel boxes (the latter being in shape like a biscuit box), the

Burman silversmiths make small oval or octagonal boxes to hold the lime which is eaten with betel-nut; the cover fits very tightly and usually has a projecting smooth edge or beading by which it is removed. These little boxes are sometimes made of gold or in niello work, as well as in silver, and are generally well designed and finely executed. They are placed in the tray of the betel box with four or more small cups or bowls having a wreath or border of flower-work near the upper edge, and in them are placed the condiments taken with the areca nut; the betel-vine leaves are placed in a double air-tight tray below the upper tray, and in the space at the bottom are placed tobacco leaves. The equipment is rendered complete by a pair of curiously curved shears, often inlaid with gold or silver damascene work. In the palace the whole box was carried on a stand and was made of gold, as indeed were the spittoons, *tazza* in elaborately carved repoussé work with pierced covers, the sword of state and any other object for the personal use of the monarch. Many silversmiths embellish these larger pieces with small fantastic statuettes made by the *cire perdue* process, which, although lost for some generations in Europe, appears to have been generally known throughout India and Thibet.

Silver.—Under the Burmese Government the buying and selling of silver might only be conducted under the supervision of a licensed broker, and each piece was named and marked in accordance with a regular scale: for example, rupee silver was said to be a mixture of—Pure silver 10 ticals, copper $\frac{1}{2}$ tical, lead $\frac{1}{2}$ tical; total 11 ticals; while the China dollar was thought to correspond to a mixture of—Pure silver 10 ticals, copper 1 tical, lead 1 tical; total 12 ticals; and so on, through many variations. The best silver from the mines was of a standard known as *Ngwe zin baw pyu*, and when to this was added $\frac{1}{2}$ per cent of copper and $\frac{1}{2}$ per cent of lead it was called *Ywet ni*. This variety can now be obtained in the market and is used to improve the quality of silver handed to the silversmith. Silver is purified of zinc and copper by melting it in a crucible and adding a small quantity of lead, on which the greater part of the alloys is given off in gas. The addition of lead is repeated if necessary. In our days, English bar silver is used by the silversmiths of large towns, but in the district rupees are still melted down, especially for small work.

Method of Working.—The method of the Burmese silversmith can best be explained by describing the making of a bowl. The silver is melted in a flat clay saucer over a flaming fire and, when purified, is allowed to cool in the saucer, which serves as the mould to produce a plate, flat on one side and convex on the other, about $\frac{1}{2}$ inch to $\frac{3}{4}$ inch thick. The silver plate is then gradually beaten out on a round iron anvil with an iron hammer until it is of the full diameter of the bowl to be produced. Throughout this process, and until all hammering is over, it is from time to time heated to red heat and dipped in cold water to preserve its ductility. The right diameter being attained, an edge or lip is raised by hammering with a straight-edged hammer at an angle of 45°, and when the lip has been raised right round, the operator begins beating on the bottom in a narrowing spiral line until the centre is reached, when he steadily works outwards and again inwards, and so on. This process causes the lip or edge to rise, and it is continued until the full height required has been obtained. The bowl is then beaten with a small hammer on a small curved iron anvil until it is of the right shape, when it appears fairly smooth and covered with innumerable small hammer marks. A composition of earth oil 2 parts, brickdust 2 parts, and resin 4 parts is now prepared and melted into the small bowls, and a short stick is thrust in to serve as a handle. In large bowls an earthenware jar, tapering towards the bottom, is placed about halfway down the bowl and the space between the two filled up with the composition.

The lines dividing the surface horizontally are drawn on by compass and then with a graver. The surface is divided into the various "houses" or portions for figures, and the borders and the flower-work drawn with a pencil and marked out with a graver. The master generally draws a small portion as a pattern, which is repeated by his pupils; he should also draw the figures in pencil, unless he has a skilled pupil. When the entire pattern has been engraved in line, the first embossing takes place, by which all the parts to be lowered are punched in and recede into the pliant composition, which also forces out those portions which are to be in relief. When this is done the composition is melted out, and those portions which are not yet in high or sharp enough relief are punched outwards from inside until the whole is satisfactory, which generally means that this process has to be repeated two or three times, the silver being annealed each time. In inferior work but one firing is given and the resultant work is very coarse and blunt. When, however, the bowl is ready for the finishing work, it is again filled with the waxlike composition and the edges of the embossed portions are defined, and it is handed over to be chased, carved and cut about until every face has expression, all clothes texture, until the leaves curl over round the gracefully twining tendrils, and the whole composition receives those last touches which show to all the design that has from the beginning been clear in the creative brain of the artist.

When the work is finished it is heated in the fire and then boiled in a solution of alum for half an hour, and washed and then brushed with soapnuts and cold water. The flower-work is burnished with small brass-wire

brushes and the large smooth portions with steel burnishers, and if the purchaser requires a glittering mass the whole is rubbed with white enamel beads; but this process, besides rendering everything indistinct, takes off the sharp edges and destroys the best part of the work.

In many compositions, such as centre-pieces, vases and candlesticks, figures in the round are introduced. The figure is first shaped and carved in a composition made of—Beeswax 2 parts, resin 1 part. When correctly modelled, the wax figure is coated over with a thin layer of fine clay, well-kneaded and mixed with dried powdered horse dung and afterwards with a thicker layer of river silt. The mould is baked in the fire, the wax melts and runs out through a hole left for the purpose, and the clay becomes as hard as a brick. The melted silver is run in while the mould is red hot, and when cool the mould is broken, and the silver figure is chased and carved until complete.

Tools and Plant.—Among the tools and plant of a worker in silver is an open charcoal hearth fanned by English or Burmese bellows. The latter deserves a word or two of description, as they are used in many trades. They are of all sizes, from the tiny model of the goldsmith, which may be worked with the little finger, to the huge apparatus of the brass-founder, requiring a man to each rod. The bellows are formed by placing vertically, side by side, two hollow bamboos plugged at the bottom. From just above the plug two small bamboo pipes converge to the hearth, where they are connected by a fireclay nozzle. The blast is formed by compressing the air in the tubes by an ingenious contrivance, which serves at the same time as a piston and as a valve for admitting air. Each tube or cylinder is fitted with a rod, at the end of which is tied a bunch of cock's feathers with the quills upwards; when the rod is forced down, the feathers are pressed against the side of the cylinder by resistance of the air and an air-tight piston is obtained; when the rod is drawn up again, the feathers trail downwards and the cylinder is filled with air. The rods are worked alternately, and in all (except the largest blowers) are connected at the top by a bar pivotted at a point between them, so that a reciprocating movement can be given by pushing up and pulling down one end of the cross-rod by means of a light bamboo. The combined piston and valve closely resemble the feather brushes used for dusting pictures. The other tools used by silversmiths are crucibles, hammers, small anvils, blowpipe, spirit lamp, many sizes of punches and small chisels, a small tapping hammer and round steel burnishers. Some men are able to use the lathe.

Profits.—The best master-silversmiths are able to make a profit of about 30 per cent on the ultimate value of the work turned out of their shop, provided that there is enough work to keep all hands busily engaged. This is not, however, often the case, and the trade is not a paying one. The leading artists are devoted to their art and are quite content if they can gain enough to live on, provided they keep their position at the head of the craft. Workmanship is paid for by weight and can be obtained at from eight annas to one rupee eight annas per rupee weight; the worst work is dear at eight annas, but the best or master-silversmith's work is decidedly cheap at one rupee eight annas, and the artist will not give it willingly on pieces weighing less than one hundred tolas. A small bowl made entirely by a good master-silversmith is practically sold according to its artistic value and not by weight.

Niello Work.—Many of the silversmiths of Burma are proficient in this art, though few are fond of it, because it entails working over a hot furnace and in sulphurous fumes. The design appears as if drawn in silver outline on a black ground. The articles made are cups, lime boxes, plates and knife handles, and are quite smooth with a good polish. The black enamel used is made of—Lead 2 parts, silver 1 part, copper 1 part; the materials are melted in a fierce fire and sulphur added at discretion. The object to be treated is made in silver about one-third of an inch thick, and the design is drawn and engraved as before. The lines of the drawing are left alone, but all other parts are punched in and the edges cut sharp with a small chisel. The *niello*, prepared as above, is finely powdered, mixed with borax and placed in all the hollows. The work is then placed under an iron cage in a fierce charcoal fire, where it is fused. It is then filed smooth, polished with sand-paper, then with charcoal-dust, and finally burnished like silver-work.

Silversmiths also occasionally do a little damascening, either of silver or gold on blackened copper or silver and brass on iron. The copper is blackened by melting it with five per cent of gold and a little sulphur. Plain polished cups are sometimes made of a mixture of half gold, half brass, which is said never to tarnish and has a beautiful colour.

Status and Characteristics of Silversmiths.—The occupation of silversmith is not hereditary in Burma, though it often happens that amongst the members of a particular family one or two are found in each generation to have an especial aptitude for the work. Like other men, some work steadily and some fitfully, but a good craftsman is honoured by his fellow-townsmen and his success is felt to reflect credit on the town. Government has hitherto refrained from setting up a School of Art, having been advised to encourage individualism and the

competition of one master against another, and, as far as possible, to distribute the patronage which comes in its way amongst the best master-silversmiths in the different towns. Some of the municipalities take an interest in their handicraftsmen and help them to exhibit at the yearly Provincial Art Competitions. There remains yet the regulation of apprentices or pupils—the masters complain that a boy deserts his teacher before he has learnt his trade and undersells him with inferior work which is bought by dealers and sold to globe-trotters. It is probable that this difficulty will be surmounted by binding selected apprentices to the best masters and paying a part of their salary out of funds devoted to technical education.

The Burman silversmith has been greatly influenced by work from other countries. The Burmese Government transported whole families of artizans after the successful invasion of Siam in 1760 and the Burmese silver work gained very greatly. From about 1870 to 1885 it deteriorated very much in response to a European demand for richly embossed work in which all the leading principles of design were lost sight of in a confused jumble of inferior imitations of Italian carving. Examples of this style have been carefully excluded from this monograph, which is intended chiefly as a text-book for the silversmiths themselves. It is hoped that the connoisseur reader will remember this when reading the descriptions of the plates which follow and will not resent the didactic tone of the criticism with which he may sometimes disagree.

Description of the Plates.—The first four plates are from photographs of old bowls collected at the time of the Indian and Colonial Exhibition, and were originally taken for the instruction of modern silversmiths. The most ancient are Nos. 1 and 2 in Plate 31, which, from the style of work, are judged to date from the eighteenth century and are in low relief, but have been carried to a degree of finish requiring firing twice. Bowls Nos. 3, 4 and 5 in the same plate are supposed to have been made in the beginning of the nineteenth century and are in higher relief, but are very rough, having been fired but once; the designs are effective and well worth the consideration of modern silversmiths. Nos. 6 and 7 are of about the same date, and probably represent the best work of the period, for they are of the design used at the ceremony of washing the head of the sovereign and are ornamented with the twelve signs of the zodiac.

All the bowls shown on Plate 30 are put down to the end of the first half of the nineteenth century, say between 1840 and 1850, but No. 5, judging from the greater elaboration in the design and the tendency to confusion, accompanied by more exact workmanship, is probably the most modern. In bowl No. 1, the upper main wreath or scroll is of twisted vine tendrils sparsely leaved, treated in the Siamese manner, while the ornament at the base is of conventional lotus leaves divided as in Shan work. In all the bowls in this plate, except in No. 4, single figures are placed in "houses" formed by cusped arches of plain polished silver in high relief with a pendant below the truncated pillar of the arch, while in the spandril is shown a plain, bold spray of foliage. In No. 3 the just limit of elaboration is reached which in No. 5 is so developed that the leading lines are almost lost. Even where the foliage work is Shan, all the figures in this plate are in Burmese style. In No. 2 the upper scroll is of Burmese work, and is mean and uninteresting. The base is ornamented with a lotus leaf in the Burmese manner from which spring leaves of "foreign" design; this is the earliest known instance of European influence. The upper scroll of No. 3 is a mixture of Siamese and Shan foliage, and the attempt of a modern master silversmith to reproduce this exquisite design is shown in the lowest figure of Plate 34. The upper wreath of the fourth bowl in Plate 30 is an example of Burmese foliage in which figures of animals are introduced, the base showing the lotus treated in European style. This is the earliest known example of a bowl on which a "Zat" or story is depicted, and the artist has abolished the panels or "houses" and has arranged his figures on a frieze. The story is that of the Emperor Paw Ye Thada, who, in order to satisfy his craving for human flesh, sent out gangs of men to seize travellers and bring false charges against them, on which they were thrown into prison and executed, their bodies being taken to the Palace. His people rose and deposed him. Bowl No. 5 is entirely of Burmese design, and No. 6, with the exception of the figures, is all Shan work.

In Plate 32 is shown a most excellent Shan bowl with Burmese figures. The design is simple and effective and the subdivision of the surface is in just proportion; the polished lines are in the right places and the degree of relief is regulated according to the importance of each several part. Burmese master silversmiths should study this bowl very carefully so as to understand the principles which guided the artist who made it, and if they have not quite made up their minds let them compare it with the bowl shown on Plate 33, which is badly designed and carelessly made on a single firing.

The work shown in the first four plates was all executed with brass tools and at a time when no great store was set on highly finished execution. With the steel tools now in use it has become possible to give sharp work in high relief and at the same time to meet the demand for exactness. Plate 34 shows an adaptation of old designs by Maung Shwe Yon of Rangoon in 1885, or thereabouts. Maung Shwe Yon also designed and made

the pierced bowl given in Plate 35, which is the best example of this kind of work ever produced. The foliage is a combination of three kinds of flower work known as *tazin ngwe*, *kalla ban* and *kyu det*, and the skill with which the different styles have been combined to prevent monotony in the general effect is greatly appreciated by Burmese silversmiths. Round the base of the bowl is an arrangement of the leaves of the water cabbage (*hmaw*). Maung Shwe Yon died in 1889, shortly after he had finished a splendid trophy for the Mess of the Royal Engineers at Chatham.

Another great artist was Maung Myat San, and a small bowl by him is contrasted on Plate 36 with the work of a present day prizeman. The illustration does not do justice to the modern bowl, because much of the detail is lost in glitter, but after making all allowances, it cannot compare with work of the old master, which for clearness and charm of design, accuracy of workmanship and restraint, has not yet been beaten. This bowl was probably made about the year 1860.

It is interesting to compare the larger Shan betel-box cover shown in Plate 37, which is thought to date from the eighteenth century, with the Burmese work of the same period (Plate 31, figs. 1 and 2). The value of plain polished dividing lines is seen in both, but in the Shan work they are in higher relief, while in all other respects the Burmese work is better. The smaller Shan betel-box in Plate 37 shows a greater advance in design, while that in Plate 38, which is supposed to have been made about the year 1850, is better still. The silver pipe with an ivory stem in Plate 37 is a quaint piece of work in which the ornamentation of twisted wire and small beads is very effective; this pipe and the dagger above probably belonged to a *Sawbwa* or Shan prince; the lotus bud at the end of the handle of the dagger is in excellent taste.

The buckle in Plate 38 is given to show how a good Burmese silversmith can adapt an old design to modern needs. Shan silverwork is brought to Burma by pedlars and can be purchased without difficulty at the rate of twenty rupees for fourteen tolas weight, but it can sometimes be obtained for its own weight in rupees. In Plate 39 is shown a bowl made about the year 1884 by Maung Ba, now deceased. It is a modern example of a bowl without "houses," of which the earliest known is that numbered 4 in Plate 30. The upper scroll in this bowl is a combination of *kyu* and *tazin ngwe* foliage which is twisted over. The ornamentation of the base is composed of *kalla ban* set within a skeleton of lotus arranged after the Shan custom. The story is that of Wethandiya, one of the ten holy legends of Gaudama in a previous existence, and the prince is represented as making an offering of the white elephant of the kingdom to the Brahmins of the palace who, it will be noticed, wear a peculiar head dress. For this act of generosity Wethandiya is banished by his father and may be seen setting off in his chariot with his wife and two children. It would take too long to recount the further pathetic adventures of the family, but the story is beautiful and is the favourite of all in Burma.

The sugar basin shown in Plate 40 was made by Maung Pauk Tun, since deceased, and is a good example of modern work in very high relief. The bowl in the same plate is placed in the middle of the last century and was made in Arakan, probably for a Musalman, being without figures. The borders are of Shan flower work with leaves after the Siamese fashion. This interesting little piece of work was rescued from the melting pot.

The bowl shown in Plate 41 is by Maung Yin Maung, who has taken the first prize two years running at the Handicraft Competition held at Rangoon. The figure work is very good and the foliage skilfully designed and well executed. The bowl was made in 1900 and the artist has much improved in designing since then. The scene represents a king in consultation with his ministers.

In Plate 42 is given the representation of a *Swun ok* made by Maung Po Thet in 1885 or thereabouts. It is in the shape of the pagoda-shaped bowls used by the king when he offered rice at a pagoda, and is an excellent piece of work, though not of the most graceful shape.

The Pagoda Trophy presented for Association football by the Burma Athletic Association is given in Plate 43, and is carefully finished, though not a good model of the Sulè Pagoda which it is supposed to represent. Burmans are rather fond of models of pagodas in gold or silver.

Plate 44 shows the statuette of a *belu*, or ogre, with which Maung Yin Maung of Pegu won the prize for work in the round, at the Handicraft Competition of 1900. It is of brass, but is made by the *cire perdue* process by a silversmith, and is remarkable for the pose and action. Burmese connoisseurs object to this *belu* wearing flowers in his ears; his accoutrements also are of Siamese fashion, which is incorrect in a Palace ogre.

In the last plate the pupils of a silversmith are shown at work, the figures at the extreme right and left being in usual attitudes.

LIST OF ILLUSTRATIONS.

The Silverwork of Burma.—30 to 44. Burmese Silverwork. 45. Burmese Silversmiths.

30. Burmese Silverwork—Old Bowls.

31. Burmese Silverwork—Old Bowls.

32. Burmese Silverwork.

33. Burmese Silverwork.

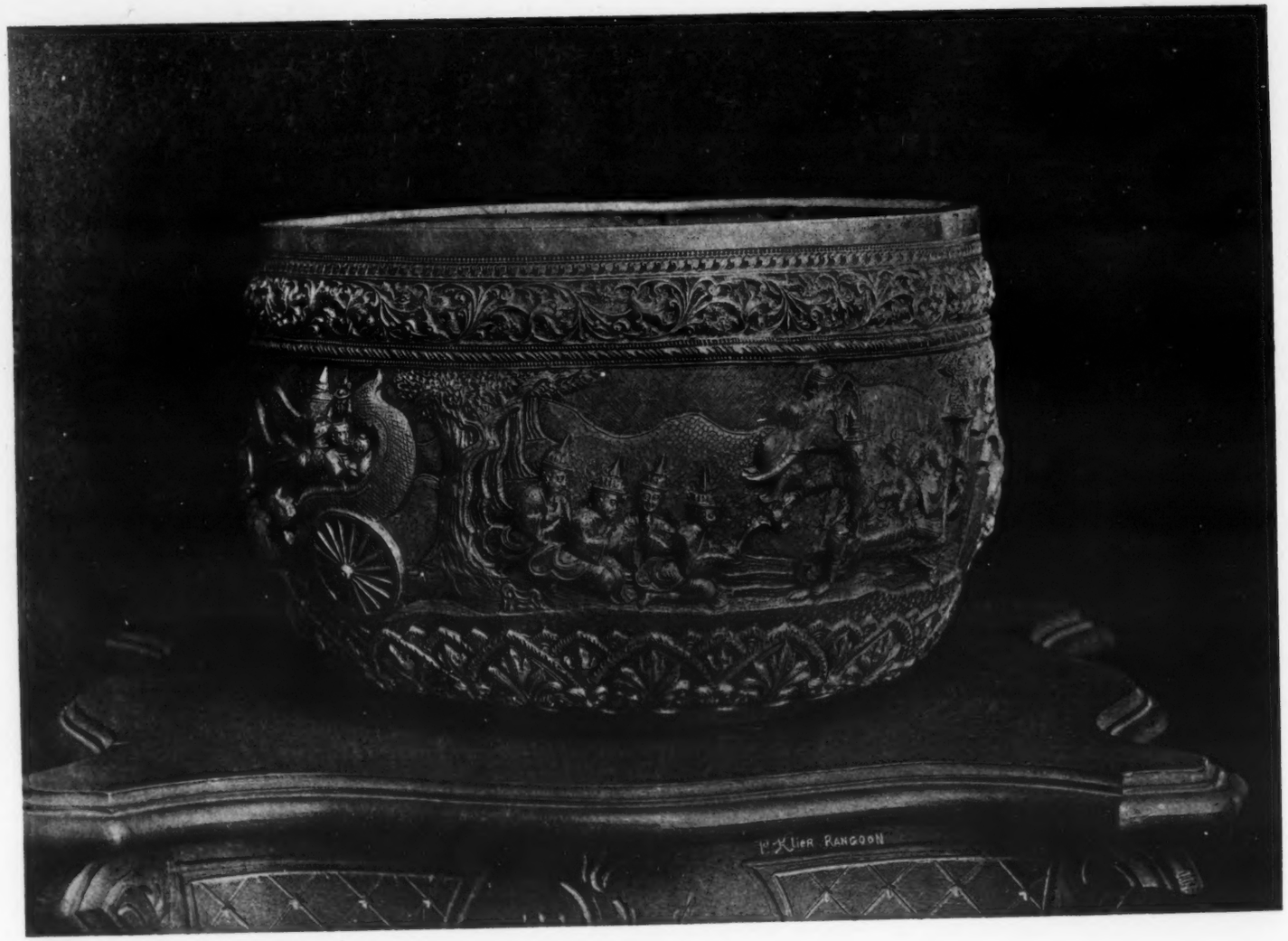
34. Burmese Silverwork.

35. Burmese Silverwork.

36. Burmese Silverwork—Modern and Old Bowls.

37. Burmese Silverwork.

38. Burmese Silverwork.

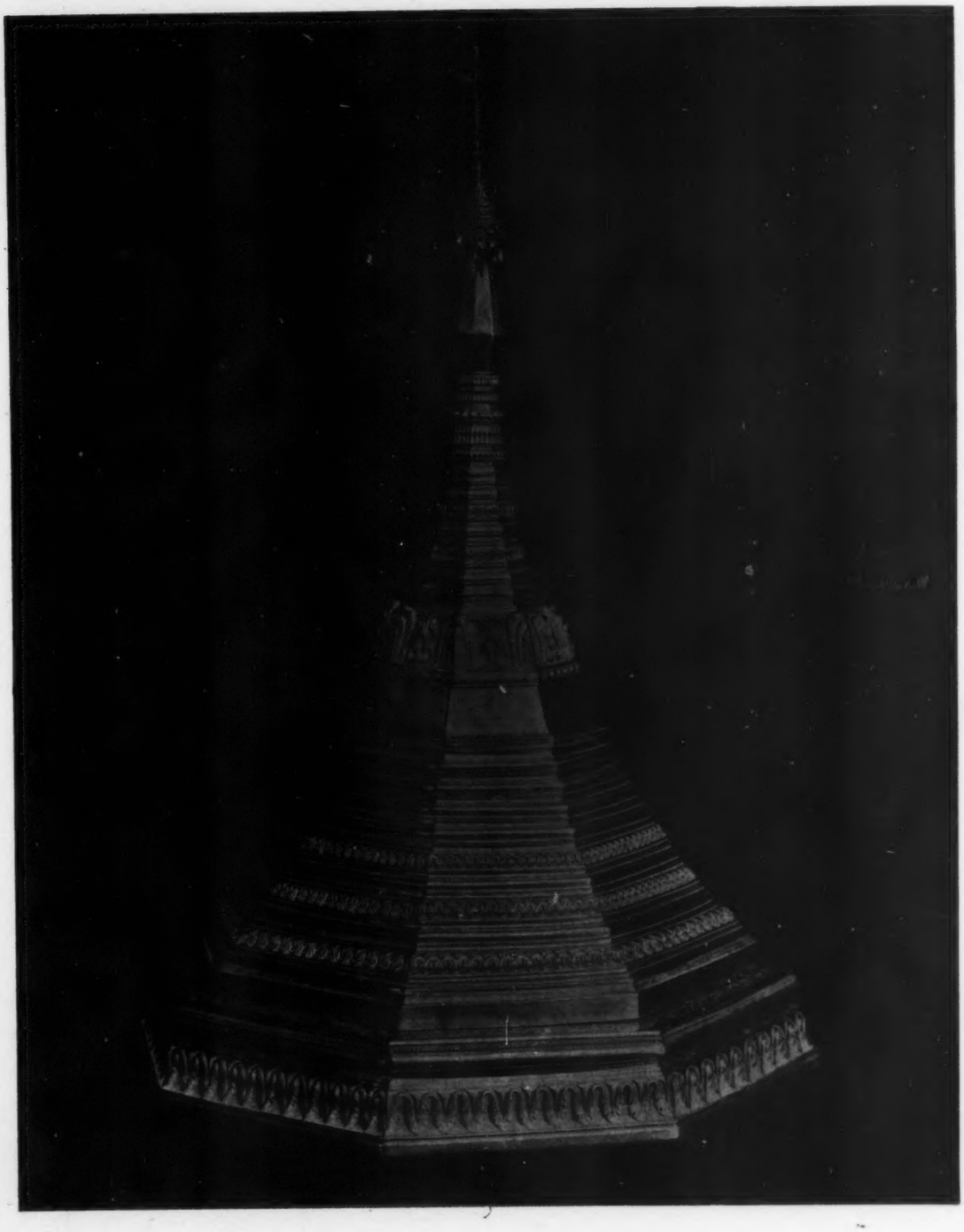


39. Burmese Silverwork.

40. Burmese Silverwork.

41. Burmese Silverwork.

42. Burmese Silverwork.



43. Burmese Silverwork.

44. Burmese Silverwork.

45. Burmese Silversmiths.

The Journal of Indian Art and Industry.

THE JAHAZI MAHAL AT SHUJABAD.

By Dr. VOGEL, Archaeological Surveyor, Panjab.

Shujabad is situated some twenty-five miles south of Multan on the way to Bahawalpur. The town is chiefly built of brick, and is surrounded by a wall with four gates. A broad bazar runs from the Multani gate on the north to the Rashid Shah gate on the south, and is crossed at right angles by another straight bazar running from the Mori Mori gate on the east to the Chautaka gate on the west. The city was founded in A.D. 1750 by Nawab Shuja' Khan, who built the present walls in 1767 and 1772. The town was a favourite residence of the Nawab and great pains were taken by him to induce Hindus of wealth to live and trade in it. Under his son Nawab Muzaffar Khan the prosperity of the town was still further advanced. Besides eight large houses, one for each of his sons, this Nawab built at considerable cost the Mubarak Mahal, the Samman Burj and the Jahaz Mahal.[1]

The Jahaz(i) Mahal or Ship Palace, situated close to the Multani Gate and now used as office of the Tahsildar is neither of great age nor of architectural importance, but borrows its chief interest from its ceiling and wall decoration and from the name of its founder, the last Nawab of Multan. Its dimensions would hardly justify its designation; its ground plan is regular and of great simplicity, having in its middle an octagonal room, the centre of which was once occupied by a marble fountain which disappeared after the building had ceased to be a nobleman's mansion.[2] At present a considerable portion of the room is filled by a square platform with a wooden railing, used by the Tahsildar when holding his court. The central room is surrounded by four oblong octangular chambers alternating with four small apartments of irregular shape, which correspond by corridors with the main room, the whole forming a square of sixty by sixty feet.

In the middle of each of the four outer walls is a doorway. The main entrance from the south is surmounted by a heavy balcony. On the east and west sides the doorways consist of three scallopped arches supported by double pillars of carved woodwork, protected outside by a curious curvilinear wooden weathering, as is also found on the two other sides of the building. The windows are square and filled with well-carved wooden screens.

Originally the house had a second storey consisting of only one room, which being considered unsafe, was removed some eight years ago. The two above mentioned buildings—Mubarak Mahal (the Blessed Palace) and Musamman Burj (the octagonal tower) have likewise disappeared. The Hammam (Turkish bath) is now used as a store-room and has lost the splendour which perhaps it once possessed. In a detached building (now used as a hospital) some frescoes are found similar to those in the palace itself.

The most puzzling point about the Jahazi Mahal is certainly its name. Tradition—it is true—accounts for it by asserting that the palace was built after the fashion of a ship.[3] But without the help of an Oriental imagination it will be impossible to find in its appearance a justification for its interpretation. Some local authorities on the other hand assert that *jahazi* is merely a corruption of *hijazi*. This indeed would seem more plausible, considering the great resemblance of the two words, especially when written in the Persian character, but for the testimony of one of the surviving descendants of the founder, who assured me that Jahazi Mahal is the correct form. Anyhow, the name was evidently intended to indicate the occasion on which the edifice was erected, namely, the safe return from a pilgrimage to the holy cities of Mecca and Medina.

The year of its foundation is contained in the three following Persian chronograms, inscribed over the entrance to the central room from the east:—

[1] E. D. Maclagan, *Gazetteer of the Multan District*, Lahore, 1902, p. 365 sq.

[2] A beautiful marble floor, which existed in one of the halls (probably the central one) has been used to decorate the Multan Subscription Library.—Multan Gazetteer.

[3] Arabo-Persian *jahaz* means "ship"; the adjective *jahazi* "navalis," and used as a noun "sailor." It is curious that the term *jahaz(i) mahal* is found elsewhere in India, *e.g.*, at Bundi (Rajputana) and at Mahrauli near Delhi. At Hissar (Panjab) there is a Jahaz garh (Ship fort), but here the name is supposed to be a corruption of "George," the fort having at one time been occupied by the Irish raja George Thomas!

الحمد لله

مظفر طالعي نواب والا — چو اين رنگين عمارت كرد برپا

خطاب آمد ز لطفِ حق تبارک — زهي خورم محل جاي مبارک

سنه ۱۲۲۳ هجري

RIGHT.

افوض امري الي الله

زهي غريب محل جلوه گاهِ زينت و زين — بناي حضرت نواب حامي البحرين

خرد سال بنايش چو در معني سفت — عجب عمارت دلكش بناي زيبا گفت

سنه ۱۲۲۳ هجري

CENTRE.

حسبي الله

مظفر لوا سرور بحره بند — كه در سايه حق تبارک بود

عمارت بنا كرد گفتش فلک — دل آرا عمارت مبارک بود

سنه ۱۲۲۳ هجري

LEFT.

Praise be to God!

When the exalted Nawab, of victorious fortune, erected this ornamented building, the message came from the kind God (blessed is He!): "How happy a palace, how blessed a place!"

I give up my cause to God.

What a marvellous palace, a world of ornament and decoration, the building of the noble Nawab, the pilgrim to the two holy cities. In the year of its building, the Intellect, when it bored the pearl of meaning, said: "A wonderful and charming structure, a beautiful building!"

God is sufficient to me.

The fortunate chief of victorious banner—may he be under the banner of God (blessed is He!)—erected the building and the sky said to him: "Blessed be the charming building!"

The date resulting from the chronograms, also expressed in figures, is A.H. 1223, corresponding with A.D. 1808. Passing on to the opposite western room, one finds its walls decorated with curious pictures of cities and palatial buildings, painted on sunk panels of different sizes and shapes, the raised corners of which are mostly filled with floral ornament. These frescoes unhappily have suffered much from the periodical whitewashing, which at places has entirely covered the painting. The colours, moreover, have undoubtedly lost much of their original brightness. This mural decoration, certainly the most interesting part of the building, contains also a reminiscence of Muzaffar Khan's pious achievement; they are said to represent the places which the noble pilgrim visited on his journey. Whether they really give a faithful picture of the Arabian cities may very well be doubted: even the *Ka'bah* will be sought in vain. But with their stately white mosques and palaces, their graceful pavilions surrounded by trees of various forms and foliage against a background of towering, reddish rocks, they certainly suggested something strange and fascinating, something unknown in the land of the five rivers and might vaguely remind the old Nawab of the wonders seen in the holy land.

The total absence of living beings to animate these scenes lends them an air of strange desolation and melancholy, suggesting that spell-bound city of the Arabian Nights, the inhabitants of which were all turned to stone. But this feature proves that Nawab Muzaffar Khan was a strict Muhammadan and, unlike many more exalted rulers of India, did not suffer any infringement of the law of Islam, which forbids the representation of living beings.

Still more attractive to the Western eye are the purely decorative paintings of scrolls, flowers and foliage which fill the spandrels and borders, exhibiting designs of great elegance, painted in uncommonly fresh and pleasing colours. It is especially noteworthy how devoid these frescoes are of that gaudiness and harshness which often disfigures mural decoration in India. On their plain white background these delicately-tinged flowers present an air of charming simplicity and resemblance: qualities the more striking in a period of artistic degradation and tasteless ostentation. The ceilings are of a type not uncommon in the Panjab, consisting of small pieces of wood arranged in geometrical designs and alternating with painted ornament and small mirrors of various shapes.

Except for its decoration the Jahazi Mahal would perhaps appeal but little to our curiosity, were it not that its founder had been one of the most prominent men in the Panjab shortly before the establishment of British rule in that province.

Muzaffar Khan[1] was the son of Shuja' Khan Sadozai, who had been appointed to the governorship of Multan by his kinsman the famous Ahmad Shah Durani. The period of Shuja''s rule was a constant struggle for supremacy with different rivals and with the rising power of the Sikhs. Finally the latter drove him out of his city and the Nawab died in exile at Bahawalpur in 1774.

His son Muzaffar (the conqueror), after repeated fruitless attempts to recover his hereditary dignity, succeeded at last in expelling the Sikhs from Multan with the powerful help of Timur Shah, king of Kabul, who appointed him governor with the title of Nawab Rukn-ud-daulah (pillar of the State). This happened in 1779 and from that year till his tragic death in 1818 he maintained himself against his manifold enemies.

Notwithstanding the external difficulties which beset him, he showed himself a capable ruler, devoting his energies not only to the defence of the province entrusted to his care, but also to developing its resources by promoting irrigation and by a frugal and wise administration. In 1790 he visited Kabul, where he stayed two years and was confirmed in his governorship when Shah-raman succeeded Timur on the Afghan throne. The bitterest enemy of Muzaffar was Abd-ul-samad, a Badozai chief who at one time had been appointed governor by Shah-zaman, and who did all he could to injure the Nawab at the courts of Kabul and Lahore. But a more formidable adversary arose in the person of Ranjit Singh, who had united the scattered forces of the Sikhs in his

[1] The following historical account has been drawn from the *Multan Gazetteer*, Muhammad Latif's *History of the Punjab*, Prinsep's *Ranjit Singh*, and Lepel Griffin's *Panjab Chiefs*.

strong hand, and after establishing himself in Lahore, the capital of the Panjab (1799), constantly and irresistibly extended his dominions over the province.

In 1802 the Maharaja directed for the first time the army of the Khalsa against Multan, but the Nawab meeting him thirty miles from the city induced him to retire after receipt of a large tribute. A second expedition in 1805 had the same result. But in the next year, on the instigation of the Nawab's old enemy Abd-ul-samad, the Maharaja occupied a portion of the Multan territory and laid siege to the city. In April part of the town was occupied by the Sikhs, but the fort withstood their attacks successfully. Ranjit Singh, not wishing to enter on a prolonged siege, for which he was not prepared, withdrew his armies.

In the period of comparative tranquillity which ensued, he took the opportunity of performing the pilgrimage prescribed by the Quran, of which the Jahazi Mahal is the lasting memorial. But even on this pious journey he did not find the rest he so much needed, for gangs of robbers, attracted by the splendour of his cavalcade, threatened to attack and were only bought off with great difficulty. He returned after an absence of fourteen months. A few miles south of Shujabad is an old garden called Mubarak Bagh from the fact that here the inhabitants of the town went to meet and congratulate the Nawab on his arrival.

In December 1807, Elphinstone's Embassy to Kabul had passed through Multan, where it had been received by the Nawab's eldest son Sarfaraz Khan,[1] who took his father's place during the time of his absence. It is said that on the return of the distinguished ambassador from Kabul he was approached by Muzaffar Khan.

In fact, the aspect of affairs in the north of India had altered in a mode not favourable for the Nawab's interests. Ranjit Singh, successful in almost all his military undertakings, had established himself as supreme ruler of the Panjab and was recognized as such in the treaty concluded with the British Government in 1809, in which the Sutlej was declared the boundary between the dominions of both contracting parties. The year of the treaty was singularly auspicious to the Sikh ruler, as it saw him in possession of the strong hill-fort of Kangra and of the important town of Gujrat. Shortly afterwards Shuj'-ul-mulk, king of Kabul, was expelled from his state and in February 1810 he was obliged to seek refuge in the territories of the Maharaja.

This offered the latter a fair pretext to renew his attempts on Multan, as this place was nominally a dependency of Kabul. On 20th February the army of the Khalsa appeared before the walls and next day took possession of the city. Muzaffar Khan having refused to pay a tribute of three lakhs of rupees, Ranjit Singh demanded from him the surrender of the Fort in the name of Shah Shuja' his overlord. But the Nawab, penetrating the true intention of his wily opponent, refused. Now every preparation was made by the besiegers to carry on the siege vigorously and the Sikh artillery was set at work. But the garrison offered so resolute a resistance that after a siege of two months, having lost many of his officers and men, the Maharaja was compelled to grant terms, and retired on receiving payment of a lakh and 80,000 rupees.

The next few years were passed in conflicts with minor opponents, such as the Nawab of Bahawalpur who had assisted the Sikhs in the course of their last assault. Of the final struggle which ended in Muzaffar Khan's death, the following lively account is given by Lepel H. Griffin:[2] "In February 1816 an irregular attack was made upon Multan by the Sikhs. A strong force had been sent to Bahawalpur and Multan to collect the tribute, and there being some delay in Muzaffar Khan's payment, Phula Singh Akali, mad and drunk with bhang, led a storming party of fanatics like himself against the town, and with such impetuosity did they make the attack that they gained possession of some of the outworks of the citadel. But Fakir Aziz-ud-din[3] made due apologies; the Nawab paid his tribute quicker than he would otherwise have done, and the Sikh army proceeded towards Mankera. In 1817 a Sikh army under Diwan Chand marched against Multan and attacked the fort, but was repulsed and retired on payment of ten thousand rupees. These attacks, however, were not made in earnest. The Maharaja was collecting his strength for a great effort, and he had sworn that Multan, which had so often defied him, should yet be his. During the cold weather of 1817 he was collecting supplies and men from all quarters, and in January 1818 an army of 25,000 men under the nominal command of Prince Kharrak Singh, but in reality commanded by Misr Diwan Chand, marched from Lahore. On the way to Multan the forts of Khangarh and Muzaffargarh were taken; the city was invested and captured early in February, and the bombardment of the fort commenced. The Nawab had a garrison of only 2000 men, and the citadel was not provisioned for a siege, but he made a defence the like of which the Sikhs had never before seen. Till the second of June the bombardment went on, and two large breaches had been made in the walls, for the great Bhangi gun,[4] the "Zam-Zam" of Ahmad Shah Durani, had been brought from Lahore and had been four times fired with effect. More than one

[1] Of this curious reception an account is found in Elphinstone's *Kaubul* quoted in the *Multan Gazetteer*, p. 50.

[2] *Panjab Chiefs* (Lahore, 1865), p. 485 sqq.

[3] Faqir Aziz-ud-din and his brother Nur-ud-din, though Muhammadans, had great influence at the Sikh court.

[4] The historical gun of Lahore, now placed in front of the Central Museum, has acquired a wide notoriety since it played a part in Rudyard Kipling's last novel, "Kim."

assault was made by the Sikhs, but they were repulsed, on one occasion with the loss of 1800 men. The gates were blown in, but the garrison raised behind them mounds of earth on which they fought hand to hand with the Sikhs. The defenders of the fort were at last reduced to two or three hundred fighting men, most of them of the tribe or family of Muzaffar Khan. The rest had either been killed or had gone over to the enemy, for they had been heavily bribed to desert their master, and many of them were unable to resist the temptation. At length, on the 2nd June, an Akali, by name Sadhu Singh, determined to surpass what Phula Singh had done in 1816, rushed with a few desperate followers into an outwork of the fort and, taking the Afghans by surprise, captured it. The Sikh forces, seeing this success, advanced to the assault and mounted the breach at the Khizzi Gate. Here the old Nawab, with his eight sons and all that remained of the garrison, stood sword in hand, resolved to fight to the death. So many fell beneath the keen Afghan swords, that the Sikhs drew back and opened fire on the little party with their matchlocks. 'Come on, like men,' shouted the Afghans,' 'and let us fall in fair fight," but this was an invitation the Sikhs did not care to accept. There died the white-bearded Muzaffar Khan, scorning to accept quarter, and there died five of his sons. Zulfakar Khan, his second son, was also wounded severely in the face, and the two others accepted quarter and were saved."

The remains of the champion of Islam were buried near the spot where he fell at the entrance of the ancient shrine of Baha-ul-haq, the renowned saint of Multan. The plain grave, after the local fashion, is covered with a *tabut* of earth faced with blue and white Multan tiles. It bears this fine epitaph in Persian :

شجاع وابن الشجاع و حاجی - امیر ملتاں زہی مظفر
بروز میداں بہ تیغ بازو - چہ حملہ آوردچوں غضنفر
چوسر خروشد بسوئے جنت - بگفت رضواں بیا مظفر
سنہ ۱۲۳۳ ہجری

of which the following is a translation :[1]

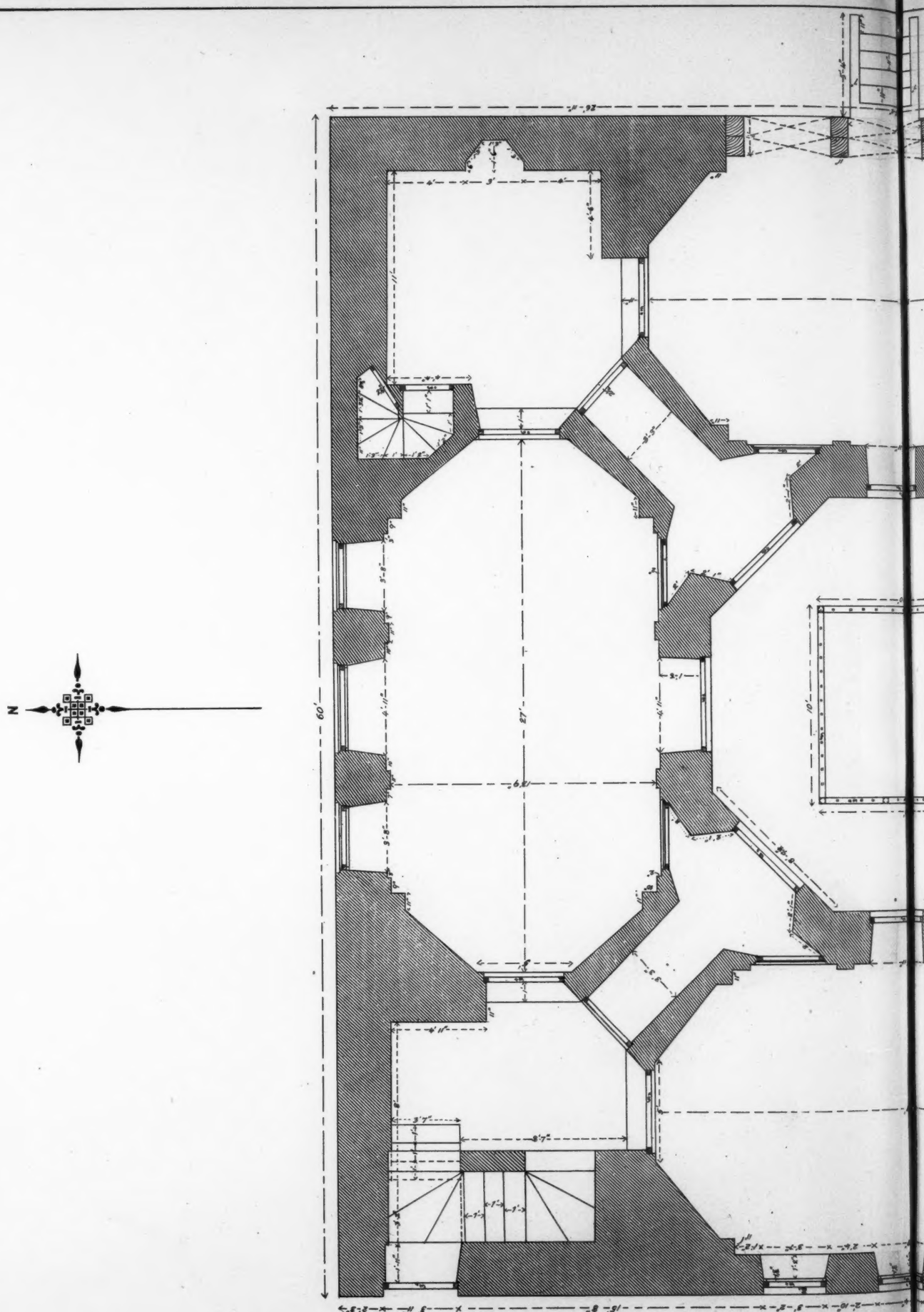
The brave, son of the brave, and Haji
Amir of Multan, O brave Muzaffar.
In the day of battle—with arm and sword—
How lion-like was his onslaught,
When, with face aflame, he set out for Paradise,
The porter of Heaven's gate cried : "Come, O Muzaffar!"
A.H. 1233=A.D. 1818.

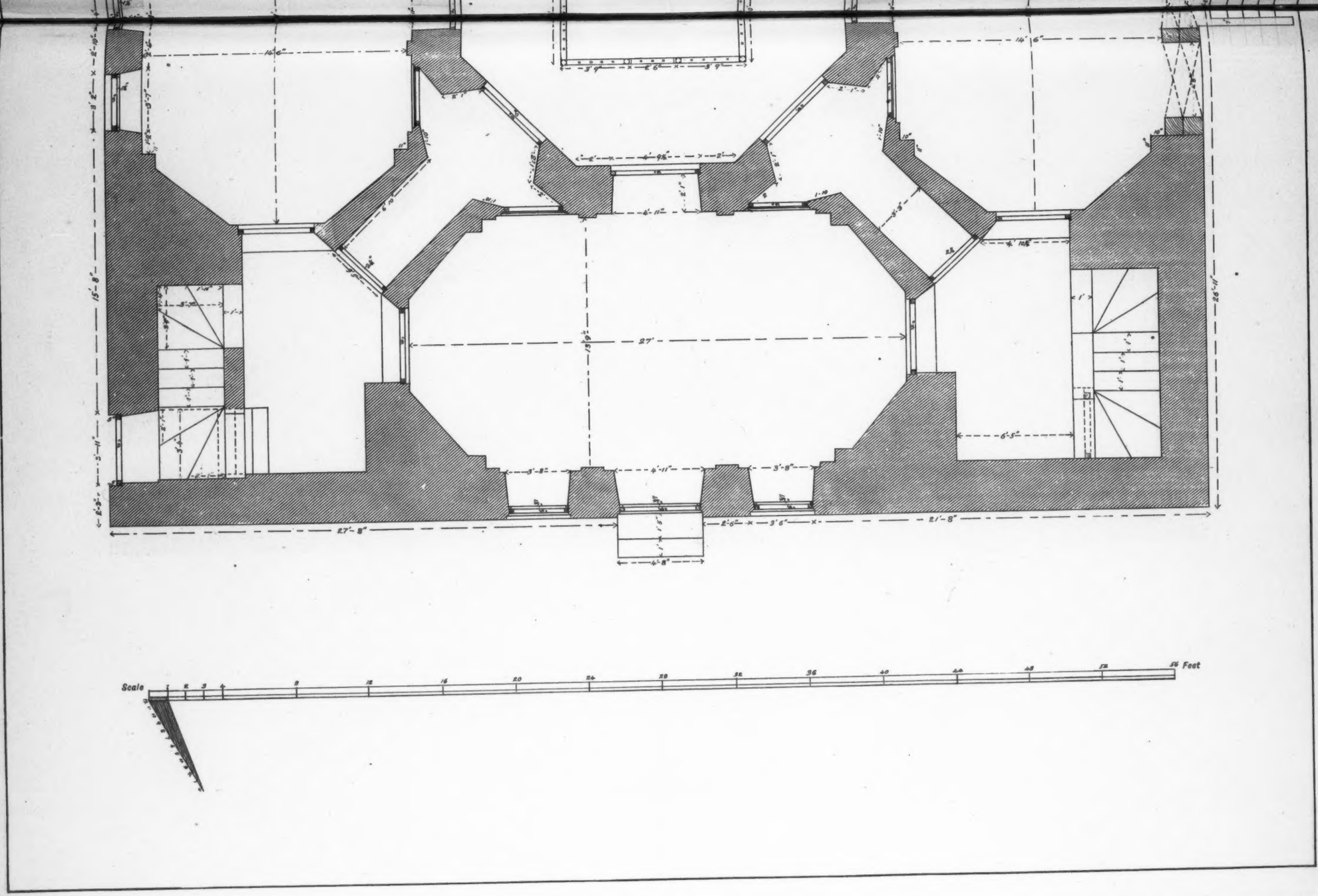
[1] E. D. Maclagan, C.S., *Gazetteer of the Multan District*, Lahore, 1902, p. 340.

LIST OF ILLUSTRATIONS.

The Jahazi Mahal at Shujabad.—46. Plan. 47. Details, West Wall. 48, 49, 50. Details, East Wall. 51. Details, South Wall.

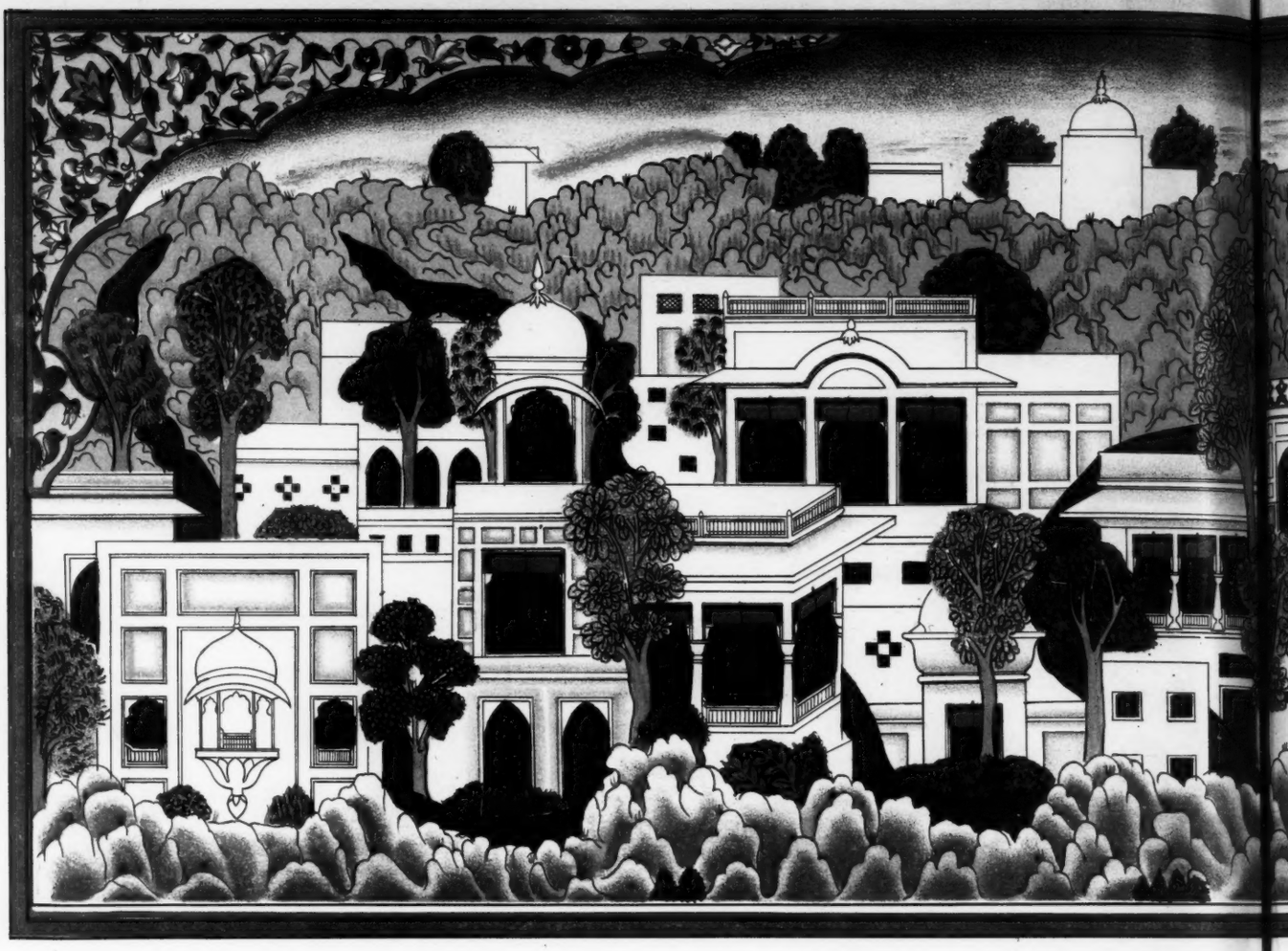
On titles of Plates 46, 48, and 49 read "Jahazi" in place of "Zahazi."


N
60'
27'



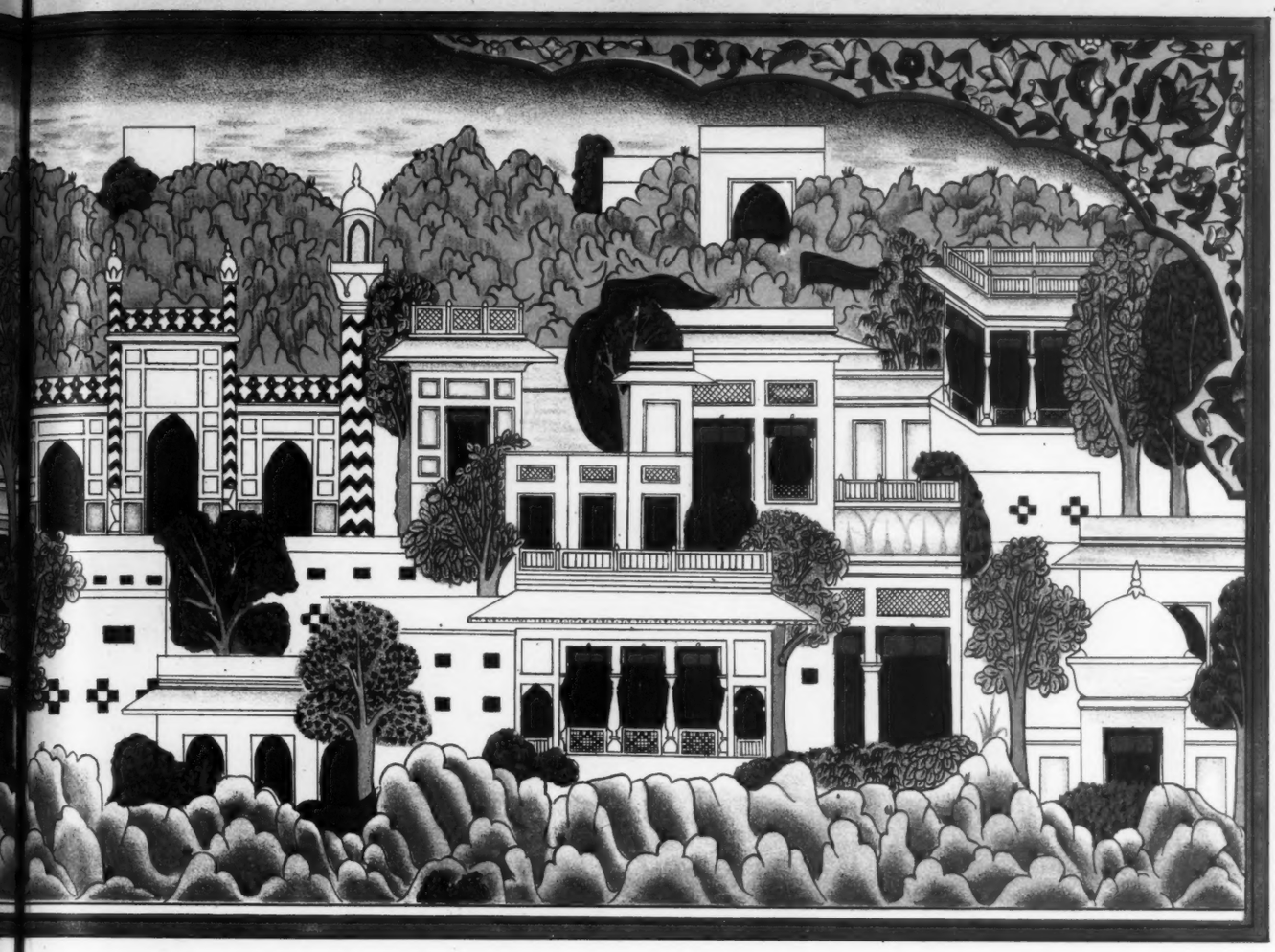
46.—The Zahazi Mahal at Shujabad.

Plan.



Detail

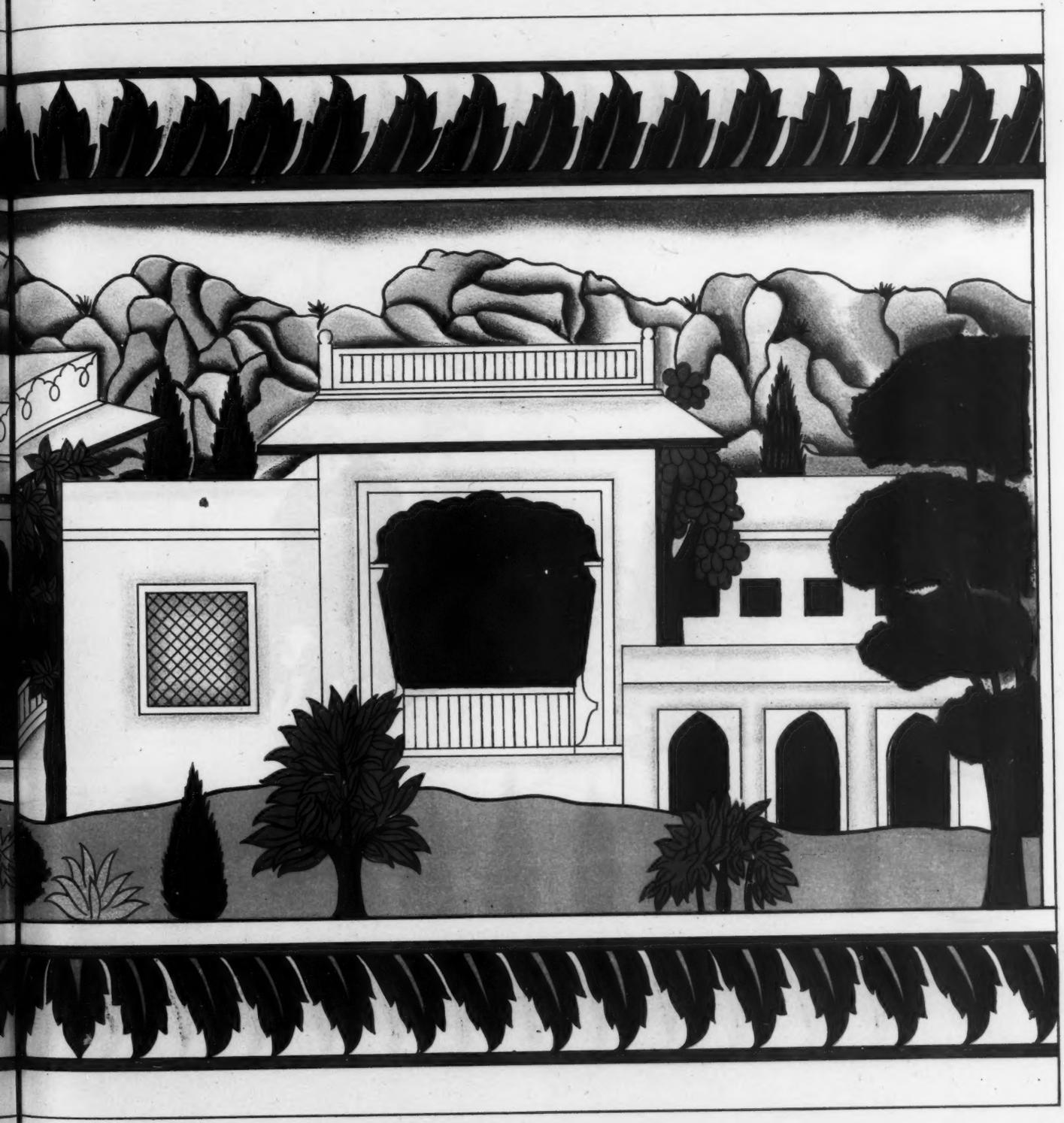
47.—THE JAHAZI
Details, No



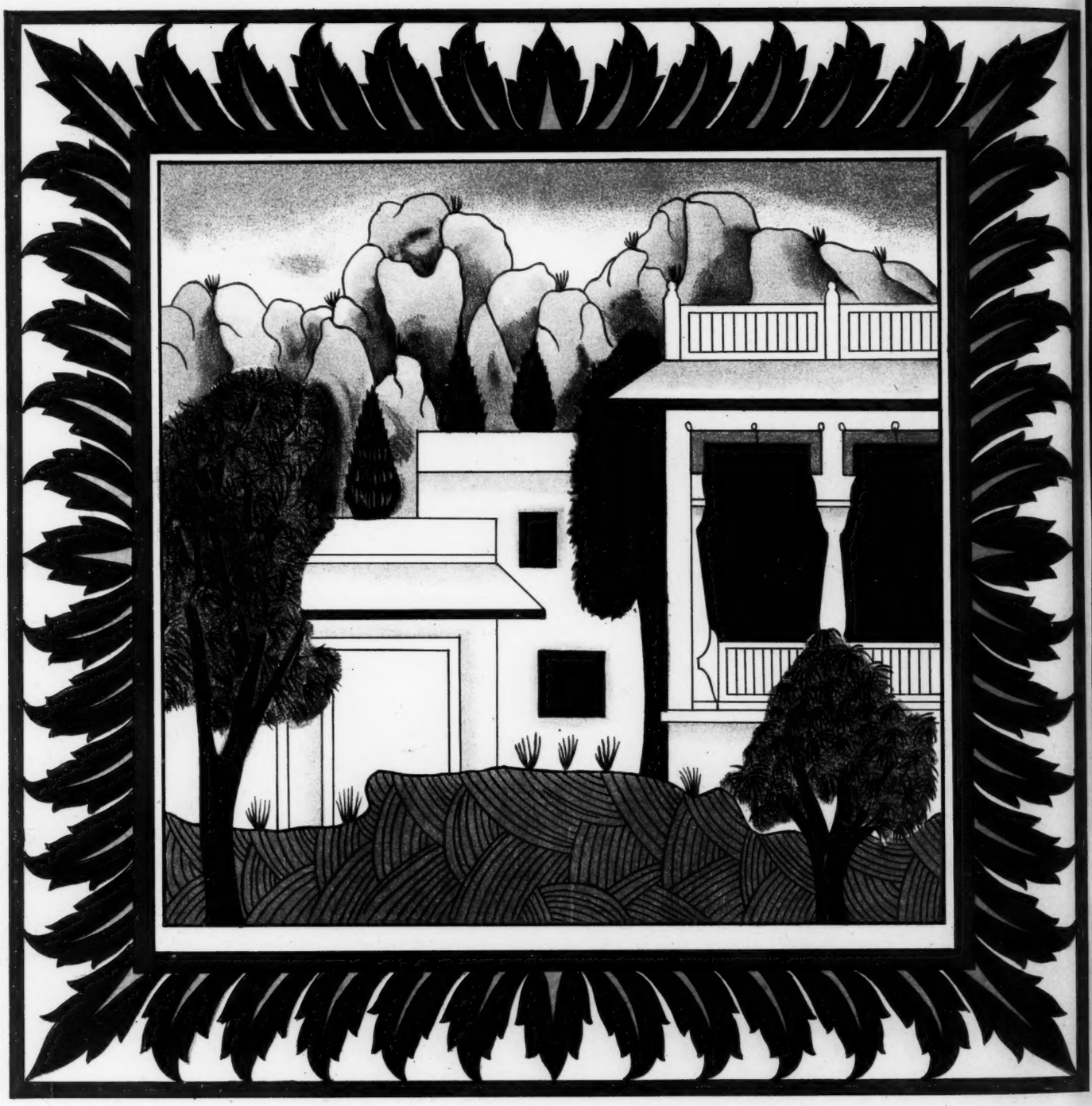
st Wall.

HAL AT SHUJABAD.
West Wall.

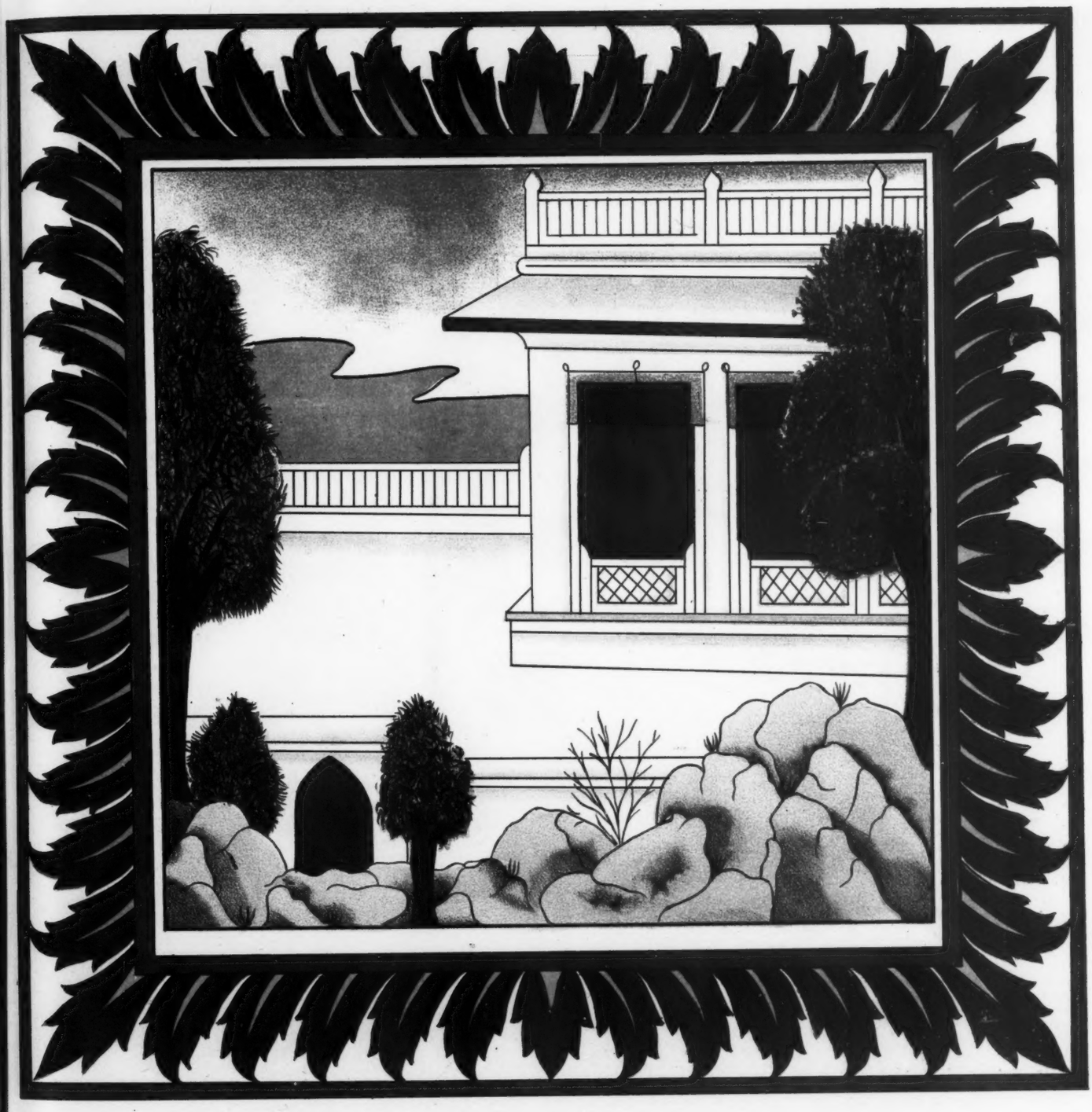
48.—The Zahazi
Details



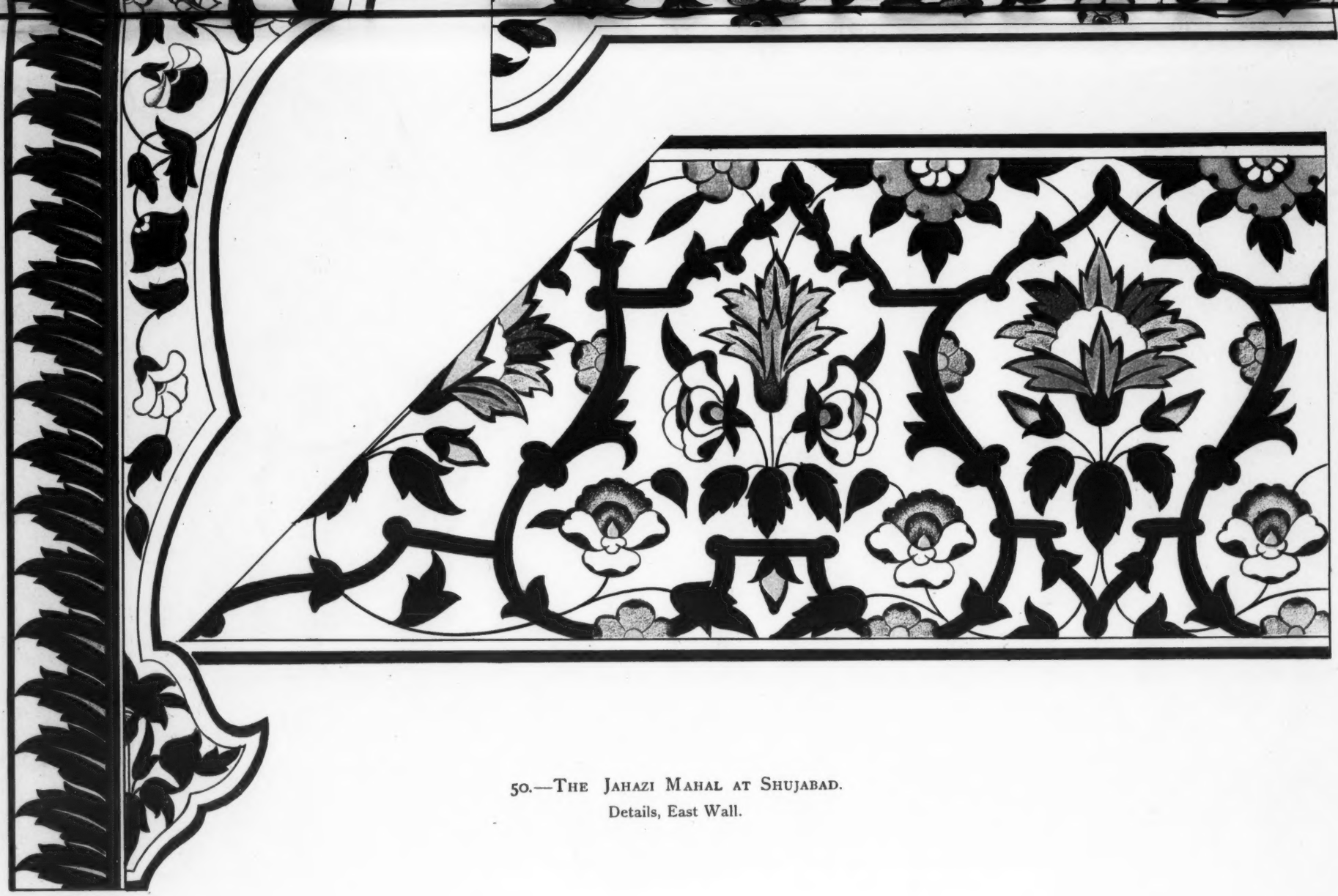
AZI AL AT SHUJABAD.
ails Wall.



49.—The Zahal
Detail



HAL AT SHUJABAD.
t Wall.



50.—The Jahazi Mahal at Shujabad.
Details, East Wall.

51.—The Jahazi[illegible]
Details, [illegible]

AZI[illegible]L AT SHUJABAD.
ils, Wall.

The Journal of Indian Art and Industry.

WOOD-CARVING IN SOUTHERN INDIA.

By EDGAR THURSTON, Esq.

For the following excellent account of sandal and other wood carving in the Mysore Province I am greatly indebted to Mr. J. E. A. D'Cruz of the Mysore Public Works Department :—

Mysore includes in its rich and varied flora the sandal (*Santalum album:* sriganda) and the teak (*Tectona grandis*) trees. Their importance and value were early recognised, and, in the first arrangements for the conservancy of forests, these woods were reserved, and any wood, except teak and sandal, was allowed to be felled on payment of a small seigniorage. Sandal has been for a long time a State monopoly, and has yielded the largest portion of the forest revenue. The girth of a mature tree varies from 18 to 36 inches, or sometimes attains 40 inches. The tree takes many years to mature. In its colour and marking, which depend greatly on its age and locale, four varieties of the wood are recognised :—bili (white), kempu (red), nága (cobra), and navilu (peacock). The two latter are the best, and realise the highest prices. The best heart-wood is used for carving, and the roots (said to be richest in oil), with the chips and shavings, find their way to Bombay, China, France, Germany, and America. The oil forms the basis of many scents, and is also used medicinally. The wood is highly scented, close-grained and tough, and, from the fineness and evenness of its structure, is capable of the most delicate carving.

The art of sandal-wood carving is confined to a few families, belonging to the Gudigar caste, in the Sorab and Ságar taluks of the Shimoga district in the north-west corner of the province. There are two or three families in Ságar, and about six in Sorab, which contribute in all about thirty-five artisans at present employed in the craft. The art is also practised by their relations, who found a domicile in Hanavar, Kumpta, Sirsi, Siddapúr, Biligi, and Banavási in the North Canara district. But the work of the latter is said to be by no means so fine as that executed by the artisans of Sorab and Ságar. The artisans of North Canara, however, excel in pith-work (an allied art) of the most exquisite beauty. They usually make *basingas*—special forehead ornaments, richly inlaid with pearls, and worn by men and women on the occasion of marriage.

The Gudigars are reported to have come originally from Goa, their migration to the towns named above having been occasioned by the attempts of the early Portuguese invaders to convert them forcibly to Christianity. The fact that their original language is Konkani corroborates their reputed Konkanese origin.

They say that the derivation of the term Gudigara is from *gudi*, a temple, and that they were so called because they were employed in their own country as carvers and painters in the ornamentation of temples. Another possible derivation of the word is from the Sanscrit *kuttaka* (a carver). They assure us that their fellow castemen are still employed in turning, painting, and other decorative arts at Goa. The Gudigars, in common with the Chitrakaras (ornamenters or decorative artists), claim to be Kshatriyas, and tradition has it that they adopted the profession of carvers, car-builders, or Gudigars 'to escape the wrath of Parasu Ráma in the sixth incarnation of Vishnu, who vowed to destroy all Kshatriyas." It may be that, as a once dominant and opulent class they took to the fine arts as a pastime, and, when times changed, adopted them as a means of livelihood. The sandal-wood carvers are also expert in carving ivory. As the Hindu caste system is connected with the profession followed, it seems possible that the Gudigars of Mysore may be distantly connected with the Kondikars or ivory-carvers of Bengal—Rungapúr and Múrshidábád.

The tools employed by the artisans are primitive, and, although of many shapes and sizes, may be classified as follows :—(1) The saw, from the ordinary hand-saw for cutting the log into planks, to a very fine hand fret-saw employed for cutting the teeth of combs. The fret bow-saw, which forms a part of the equipment of carvers generally, is not used. (2) The plane, ordinarily manufactured by the village artisan, for smoothening the surface of the plank to be operated upon, and for planing cornices or mouldings. (3) The mallet: a slip of wood about 9 in. by 1 in. by $\frac{3}{4}$ in. (4) The hone: a rough slab of fine-grained, hard stone, with one face rubbed down, for sharpening tools. (5) The chisel, which is of various forms, viz.: the firmer, a flat instrument, square, curved, or skew-edged, the last for working in sharp corners; the gouge, or hollow chisel of varying size and curvature of edge; and the engraver. The sizes of the chisels vary from $\frac{1}{2}$ in. to a width scarcely greater than that of the point of a steel nib. The tools are made from European umbrella spokes, ramrods, and country steel.

As he squats on the ground in characteristic Indian fashion, the carver wants neither table hold-fasts, hand screws, nor dogs. He holds down the piece he is carving with one hand, while he carves with the other. At

times, if need be, he thinks nothing of enlisting the aid of his toes, to supplement his hands in holding the piece which he is engaged on. He generally places it on a tripod about 1½ ft. square and a foot from the ground, so as to have it sufficiently near his eye, and turns it round in any direction he requires for the convenient use of his tool. Having selected his wood, the carver cuts it into slabs or planks of the size and thickness required, which he proceeds to plane and join together, and so construct his cabinet, *mandasana*, glove-box, or whatever article he is about to execute. Having finished the planing and joining work, he takes the parts to pieces, and proceeds to inscribe the design or pattern on the wood with an engraver, outlining the design in all its details. The next process is "bosting," or cutting away roughly between the outlines of the pattern, by which means he gets a rough model of the subject, which he proceeds to finish. He starts with a large tool, and goes over the work several times with tools of finer and finer edges, till he perfects his work in every detail of shape and curve, and gradually gives it the light and shade, the bold relief and deep under-cutting, which give his work the beauty and finish for which it is celebrated. The minute details and characteristic fineness of the work are effected by the smallest veiners and eye-tools, of which the artisan has a great number and variety. A peculiarity of the sandal-wood carver of Mysore is that he disdains to use a file, and does the cleanest and most finished work with the chisel alone, aided by the fine texture of the wood and the extreme sharpness of his tools. Owing to the constant strain which the fine lace-like work he is employed on imposes on his eyes, the eyesight of the Gudigar is known to fail in early life.

The only flaw, readily discernible in the beautiful work turned out by the Gudigars, is their inferior and clumsy joining work, which is, however, beside their art, and belongs more to the domain of the cabinet-maker. It is also noticeable that, in cabinets most richly carved, drawer-knobs are of the plainest and roughest description, resembling those of an inferior bazár-made article.

The early improvement in the art of sandal-wood carving in Mysore, which far excels the art as practised in the adjoining towns of North Canara by the same caste, may be attributed—(1) To the abundance of sandal-wood at Sorab and Ságar, as an artisan, who constantly works on it, cannot but soon become aware of the possibilities of a wood of its characteristic texture for elaborate and delicate carving; (2) To the patronage of the early Mysore chieftains or Poligars; (3) To the object lessons in design, afforded by the beautiful and elaborate stone-carvings in the neighbouring temples of Halebid and Belgavi.

For the last century, however, the art may be said to have remained *in statu quo*. The stagnation may be accounted for by the following facts:—(1) That to master its technicalities is slow and tedious work; (2) That an inborn artistic taste is necessary for success in the art; (3) That the art is not taught, but acquired by patient observation and imitation on the part of the novice, while there has been no effort or pretence on the part of the master craftsman to teach the art even to his own children; (4) That the oriental conservatism of a caste or trade guild tends to the strict reservation of trade secrets within the limits of the guild. Some or all of these causes have tended to centralise the art, and make it the exclusive property of the few who practise it at the present day.

The stimulus which the art receives from time to time at the present day is from orders from the Government, corporate public bodies, or Máharájas, for address boxes, cabinets, and other articles, specially ordered for presentation, or for the various fine art exhibitions, for which high prices are paid. But it is believed that, although the encouragement thus offered tends to increased excellence in the technique of the art, it has no effect in spreading a knowledge of it, or in calling more craftsmen into existence, as the orders are rarely so large as to be beyond the producing capabilities of the few who are at present engaged in the craft. In conversation with the workmen imported from Sorab and Ságar for work in the palace now being built for H.H. the Máháraja of Mysore, which affords an admirable object lesson for those interested in the question of technical education, it was elicited that there are several Gudigars who, from the want of a due taste for the art, never acquire it, but are employed in carpentry and turning. Others, having acquired lands, are engaged in cultivation and fast losing all touch with the art.

Viewed as an industry, sandal-wood carving is certainly insignificant. The articles ordinarily manufactured for the native market are combs, toilet paint-boxes, jewel boxes, small images, shrines or *mantapas*, toys (horses, camels, elephants, lions, deer, &c.), chess-men, fans, and walking-sticks. The articles turned out for Europeans are card-cases, pencil-cases, watch-stands, mirror and photograph frames, album covers, ink-stands, paper-cutters, pen racks, envelope boxes, book racks, and walking-sticks. The more artistic creations are generally address boxes, caskets, cabinets, jewel boxes, and writing desks for presentation purposes. Very artistic work is also done in the carving of images and mythological subjects, which are much valued and patronised by the wealthier Hindus and members of the aristocracy, and kept in their houses like sacred pictures. But no worship is made to them, as Hindus only worship idols of stone or metal. A great number of mythological subjects have been

executed for the new palace at Mysore, to fill in niches in screens, and in panels over doorways, &c. Another article worthy of note is the *chamara*, made with a bunch of fine hair-like strips of sandal-wood attached to a highly ornamental handle, and usually waved before the throne of a Máharája on state occasions, or before the image of a Hindu deity when carried in public procession. A gold medal was awarded, at the recent Delhi Art Exhibition, for a magnificent sandal-wood casket ornamented with panels representing hunting scenes.

The sandal-wood carver earns from 12 annas to Rs. 2-4 per diem. At home, when he receives an order for a costly and elaborate piece of work, if not furnished with an advance, he usually spends a few days in the manufacture of stock bazár articles, which procure for him the necessaries of life for the period during which he is occupied over the more laborious task. His earnings are also supplemented by the combs, toys, and other elementary carvings executed by such of his children as show an aptitude for the art and are learning its details. The artisans are ordinarily engaged in work of the coarser kind, which finds ready purchasers in the local market. They sometimes make a varied collection of their work, and take it to Mysore and Bangalore. Some receive advances and commissions for fancy articles from fancy-goods merchants and "artware salesmen" of Madras and Bombay. But the best articles depend on commissions from the Government or municipalities, European residents or visitors. To sum up the industrial aspect of the question, it appears that the producers are few in number, the variety of articles manufactured limited, and the market circumscribed.

The following extract from a note by Colonel C. Bowen, R.E., contains valuable information on the subject :—"In India, as elsewhere, the art instinct of the people first found expression in the decoration of its temples ; and, when the instinct grew into the desire for the decoration of dwellings or of articles in ordinary use, the figures, columns, and carvings of the temples were naturally adopted for the purposes, altogether outside of religion. So we find, from the beginning, the sandal-wood carvers followed the models before them on the walls of their shrines. Unfortunately, after the architects and sculptors who elaborated the walls of Belgavi and Halebíd had disappeared, a period of distinct art decadence appears to have set in, and has lasted down to the present day. No original artist arose to treat the subjects of the Hindu Pantheon with entire originality, or to effect improvements on the designs of his predecessors ; and the wood-carvers have slavishly adhered to the same original models with the result of establishing in their work a purely conventional style. In every article that we have seen, unless in the few cases when the copy of a European picture or print has been attempted, there is to be found the same ever recurring type of Hindu god or demon, of flower and foliage, of tracery and border. There may be diversity in the arrangement or juxtaposition of each conventional part, but the art impression conveyed on the mind by one carved article, whatever it be, is exactly that conveyed by another.

"In mediæval Christian art we find that pictorial teachings in painting and sculpture were the medium of propagating a knowledge of Christian facts and doctrines, and of profane and romantic history. A traditional way of treating these subjects was adhered to by artists of all kinds, and the same mode of treatment was maintained for centuries. Yet we find that the mediæval artists were not mere slavish copyists, and, though they retained the traditional elements of the subjects and the conventional arrangement of them with curious fidelity, the style of art varied from time to time, and the artist told his story in the art vernacular of his own day. He worked very freely in the details of his picture, translating the customs and architecture, and other accessories into the fashions of his own time. In ancient Greece the same course had obtained, and it produced the greatest artists and the greatest works of art. Between these and eastern art, as embodied at least in Mysore architecture, sculpture and carving, a parallel may be drawn as regards the adoption of traditional subjects and modes of treatment, but the parallel stops abruptly when we come to variety in expression and to modifications or improvements of the original examples. Centuries ago, in Mysore, a few beautiful types were created ; for a time perhaps slight variations on these were introduced ; but stagnation followed, and artists in stone and wood degenerated rapidly into mere copyists, and copyists pure and simple they have remained to the present day."

The following extracts from Mr. L. Rice's *Mysore Gazetteer* may also be appropriately quoted :—"The designs with which the Gudigars entirely cover the boxes, desks and other articles made, are of an extremely involved and elaborate pattern, consisting for the most part of intricate interlacing foliage and scroll work, completely enveloping medallions containing the representation of some Hindu deity or subject of mythology, and here and there relieved by the introduction of animal forms. The details, though in themselves often highly incongruous, are grouped and blended with a skill that seems to be instinctive in the East, and form an exceedingly rich and appropriate ornamentation, decidedly oriental in style, which leaves not the smallest portion of the surface of the wood untouched. The material is hard, and the minuteness of the work demands the utmost care and patience. Hence the carving of a desk or cabinet involves a labour of many months, and the artists are said to lose their eyesight at a comparatively early age. European designs they imitate to perfection." And again :

"The article of their (the Gudigars') manufacture chiefly in demand are boxes, caskets, and cabinets. These are completely covered with minute and complicated scroll-work, interspersed with figures from the Hindu Pantheon; the general effect of the profuse detail being extremely rich. The carving of Sorab is considered superior to that of Bombay or Canton, and being a very tedious process, requiring great care, is expensive. The Gudigars will imitate admirably any designs that may be furnished them. Boards for album covers, plates from 'Jorrock's Hunt,' and cabinets surrounded with figures have thus been produced for European gentlemen with great success."

It will be apparent from the illustrations alone that the Gudigar, though limited in the range of his subjects, is a true artist in the technique of his art, whether it be in surface carving, *cavo relievo*, *intaglio* or incised work, high relief, or deep under-cutting, in pattern work, scroll, foliage or figurini, and in minutiæ of detail and delicate finish. He is also able to execute from a photograph an image which bears a very fair likeness to the original.

Although much has been done to improve the art by making the Gudigars contribute specimens of their work to exhibitions, thereby enlisting the *amour propre* of the artist, and by paying well for work of special excellence, it appears that much can still be done both for the art and industry. In connection with the construction of the new palace at Mysore, an endeavour is being made to improve their ideas of human proportions and features by means of clay models executed by men trained in the School of Art. The art instinct of the Gudigars at once tells them by comparison where their old and grotesque ideals of face and form are faulty, but the results are not very satisfactory. The characteristic oriental expression is lost, and a better drawn but insipid mask is substituted. It seems possible that, if photographs of Indian home life and scenery were put before them, a great deal more of reality and expression would be imparted to their carvings, apart from the increased range in design. Photographs also of pure Indian design from temples in other parts of Southern India might tend to vary their ornamentation and beautiful scroll-work.

The children of the Gudigars, who are early taught to draw their beautiful scroll-work and designs on a slate, may be educated regularly in free-hand drawing and sketching, and, without departing from the pure oriental style, be made capable of a greater variety and a wider range of subjects in the art.

While the delicacy and costliness of the wood render any extension of its use for industrial purposes impracticable, the same qualities make it peculiarly suitable for the production of works of art. Any improvement, then, in the position of the workmen or their craft will be due to the opening up of new markets for work of the highest artistic value. These would necessarily be sought for in those great cities of Europe and America, where art is highly valued and rewarded. But, if this object is to be attained, Government assistance will be required for some years to come.

Turning now to teak and other wood-carvings, Mysore teak is locally regarded as stronger than, though not so highly developed as the Burma wood, and its superiority in strength is usually attributed to its close grain, and and to the presence of oil in its pores, which is driven out of Burma teak in the process of seasoning. It is also supposed to be better suited for carved work, as it responds better than the Burma wood to the tool of the carver. The best specimens of the ancient teak carvings of Mysore were consumed in the fire of February 1897, which reduced to ashes the frontage and most ornate portion of the old palace, with the valuable relics of the ancient art of Mysore. What can now be seen of the art in Mysore, as in many other towns of Southern India, are *cavo relievo*, or flat patterns on the lintels and sides of doors, and on columns in Hindu houses, and specimens of figurini and scroll-work on Hindu temple cars which are richly carved with *swámis* and grotesque figures. Existing photographs of specimens of ancient carvings illustrate how effective and pleasing wood-carving can be made without the labour involved in the modern intricacy of design, as instanced in the beautiful door-frames and panels which have been recently executed for the new palace in course of erection. In the specimens of the old school, consistent purity of oriental design is noticeable, with all the grotesqueness of features, extravagance of pose, and disproportion of the figure; but the work is full of passionate expression. In the modern specimens of the art, by the native artisans from the Madras School of Arts, and from well-known cabinet-makers and others in Madras, there is a decided improvement in beauty of face, regularity of form, and natural pose of figure, with a distinct insinuation of western style in the scroll, foliage and figurini, suggestive of a European rendering of eastern design.

The Mysore carver, it is satisfactory to note, still shows a decidedly oriental style and taste in his design and work, although he is fast learning from the Madras artisans the more advanced technique and better finish of the latter. The articles ordinarily made in sandal-wood are :—Comb, 4 to 8 annas; toys, 8 annas to Rs.2; images, Rs.3 to Rs.8; book-rack, Rs.30 to Rs.75; paper-cutter, Re.1 to Rs.4; watch-stand, Rs.6 to Rs.50; photograph frame, Rs.50; envelope box, Rs.20; pen-rack, Rs.2 to Rs.10; card-case, Rs.5 to Rs.15; fan, Rs.3 to Rs.15; casket, Rs.250 to Rs.600; walking-stick, Rs.6 to Rs.50. The ordinary rate of carving is 10 annas a square inch.

It is stated by the editor of the *South Canara Manual* that the more well-to-do classes of the Bants occupy

substantial houses on their estates, in many of which there is much fine wood-work, and in some cases the pillars in the porches and verandahs, also the doorways, are elaborately carved. The author of an article in the *Calcutta Review* on the Bants of the Tulunad writes: "The wood-work of their houses is often richly and artistically carved. Canara, with its great mountain forests, yielding an abundance of ivory and a wealth of timbers that readily adapt themselves to the most delicate needs of the carver, was at one time the home of the most deft, skilful and artistic wood-carvers, whose descendants in all probability are the Gudigars, who at the present day are found scattered in Goa, Honavar, Mysore, and some other tracts in south-western India. These hereditary carvers had a *shastram* or science of their own, which, with wonderful exactitude and the keenest botanical knowledge, defined and described the various kinds of wood suitable for rough or delicate carving, the age, season and locality in which these woods ought to be felled, those species which require to be used alone, and those that would answer when used conjointly with other varieties, etc."

At Mudabidure, or Mudbidri, in the ruined palace of the Chautor, or local chief who follows the Jain creed, are some splendid carved wooden pillars, two of which bear representations of the *pâncha-nârîturage* (the horse composed of five women). These are fantastic animals, which are formed by the bodies of a number of shepherdesses for the amusement of their lord Krishna. Writing concerning the Jain temple at Mudbidri, the doors of which are most elaborately carved, Fergusson (*History of Indian Architecture*) states that the architecture of the Jain temples in Tuluva is neither the Dravidian style of the south nor that of Northern India, and indeed is not known to exist anywhere else in India proper, but recurs with all its peculiarities in Nepal. The reverse slopes of the eaves above the verandahs is the feature which specially resembles the style common in Nepal. He describes the exterior of the temples as being much plainer than Hindu temples usually are, and he considers that the sloping roofs of the verandahs are so evidently wooden that the style itself cannot be far removed from a wooden original. In support of this view he mentions that, in many places, on the west coast below the ghauts, the temples are still wholly constructed in wood without any admixture of stone, and almost all the features of the Mudbidri temples may be found in wood at the present day. With regard to the interiors of the temples, he remarks that no two pillars seem alike, and many are ornamented to an extent that may seem almost fantastic, and this again is an indication of their recent descent from a wooden original, as long habit of using stone would have sobered their forms. In this connection Mr. Logan (*Manual of Malabar*) states that the buildings of the kind in Malabar are invariably built of wood in all their characteristic portions, and points out that the style of architecture noted by Fergusson marks out better than anything else the limits of the ancient kingdom of Chéra, for the style prevails all along the west coast country from the limits of Canara to Cape Comorin, having been adopted even for Muhammadan mosques. Typical examples of the style of architecture abundantly met with in Travancore are illustrated from negatives kindly supplied by Mr. Narayana Iyer.

Tirupati wood-carving.—An extensive industry is carried on at Tirupati in the North Arcot district, and the adjacent villages, by men of the carpenter caste, Balijas, Muhammadans, and others. The wood which is most used is red sanders (*Pterocarpus santalinus*), which is obtained from the neighbouring hills and the forests of the Venkatagiri and Kálahasti zamindaris. It cannot, under the Forest Act, be removed from the reserved areas without a license fee. It is sold at Tirupati for Rs.25 to Rs.30 per ton. The wood-carvers say that they cannot get logs of more than a foot in diameter, as logs of larger size are taken by merchants to Madras and other places, for making house-posts. "Large sums are often given for the wood by rich native gentlemen, who take a pride in having their verandah posts prettily carved and ornamented." (Gamble). The majority of the carvers get branches only a few inches in diameter, which are sold at the rate of Re.1 per head-load. Owing to the increase in the price of red sanders wood and the difficulty in procuring it, the carvers are now using a white wood called répalla or pala (*Wrightia tinctoria*) for carving figures.

The industry is an old-established one, and has made considerable progress in recent years both as regards the quantity and quality of the work turned out. A good carver can earn a rupee per diem. Thirty years ago there were only two or three shops at Tirupati where the carvings were sold, whereas, at the present day, there are more than a dozen shops, and in addition, persons from the villages hawk them about the streets. The original model was the figure of Venkateswara-perumal, which is worshipped in the temple on the Tirupati hill. Old specimens show that the artisans did not pay much attention to the back of the figures, but were satisfied with carving the front only. In recent years they have begun to pay more attention to the external anatomy, and to give a better finish to their work, which, though rough, is executed in a bold free style.

Figures of *swámis* (deities), men, mythological animals, elephants, and miniature temple cars with flying cherubs and winged horses, are most abundantly carved; but domestic utensils in the shape of *chembus*, *kinnis*, cups, plates, &c., are turned on the lathe. The largest figures are about twenty inches high, and cost from Rs.12

to Rs. 15 per pair. Large vessels are sometimes made of the wood of vépi or áchamaran (*Hardwickia binata*), which resembles red sanders wood, but is more liable to crack. This timber is worked as soon as it is felled, and as it is heavy, men go to the forest and set up a temporary workshop there. The price of vépi is only about Rs. 12 per ton, and ordinary purchasers cannot distinguish it from red sanders wood.

The carvers sell their wares to shop-keepers, who advance money to them and supply them with timber. The carved figures are sold to pilgrims and others who visit Tirupati, and are also taken to Conjeeveram, Madura, and other places, at times when important temple festivals are being celebrated. Some petty traders sell their carvings at railway stations, *e.g.* Rénigunta and Arkonam. In recent years some of the carvers have been patronised by the railway employées, who order the most expensive articles to send to friends in various parts of the Presidency and even to Europe.

Tirupati seems to have been a centre where wood-carving for architectural purposes flourished, and even obscure villages bear witness to the fact that the industry was well patronised in bygone days. Old houses, of even comparatively poor people, possess some carvings—on the door-frames, lintel, &c. Quite recently a native gentleman at Tirupati purchased one of the oldest houses in the town, which possessed many carved pillars, architraves, &c. He pulled down the house and constructed a new one, which possessed no carvings, but all the pillars, brackets, &c., were made of plain Burma teak painted blue. The old carvings were thrown away and heaped up in the back-yard. In the construction of houses the lintel of the main doorway is invariably carved, and in the centre there may be a lotus, figure of Lakshmi, Ganésa, or other household god.

Cocoanut carving was introduced into the Cannanore Jail as an industry about 1888. At first Burmese prisoners were set to the work, and in course of time the art was acquired by prisoners of other nationalities, principally the Muhammadan Mappilas of Malabar. Large double cocoanuts (coco-de-mer) are richly carved with Burmese figures and peacocks, and supported on elephants and tigers carved in ebony. Cocoanuts intended for sugar basins, cruet sets, teapots, &c., are engraved in panels bearing richly carved figures of peacocks and Burmese men and women. At Karkhal, in South Canara, young cocoanuts are, in like manner, neatly carved with conventional floral and mythological designs; and in Travancore very spirited and well executed designs are carved in cocoanut shells. Concerning cocoanut carving in Travancore, Mr. Narayana Iyer, Superintendent of the Trivandrum School of Arts, writes as follows:—"The Malayalam proverb, known throughout Malabar, 'to carry a cocoanut shell,' means to beg, this shell being the vessel commonly used by beggars for the receipt of alms. The fruit of the bilva tree (bael: *Ægle Marmelos*) used to be ornamented with elaborate carvings, and mounted with silver and gold, for the purpose of keeping the holy ashes by Sivaites. Such carved fruits are still found in many houses, and are preserved as sacred. The cocoanut appears to have attained its religious importance from an incident in the Padmanabha-swámi temple at Trivandrum, which took place, it is said, nearly 900 years ago. A Namboori Sanyási, by name Vilwamangalathu Swámi, who was greatly revered throughout Malabar, used a half cocoanut shell, in the shape of a cup, for presenting offerings to the deity. This very cup is said to be still used in the temple, mounted in gold and set with precious stones, in honour of the Sanyási. Since the foregoing incident, the cocoanut shell has received the title of Padmanabha-swámi's vessel. The shell must have been originally scraped and polished for domestic and culinary purposes. Ornamentation by carving and piercing are of more recent origin. It is now used for the manufacture of bangles, watch-chains, sticks, and other articles. Small shells are used for carving with various artistic devices. The shell is tough, but requires great care and delicacy in carving, or the fine details are liable to crumble. The colour of the shell when polished is a fine dark brown, which becomes darker with age. The tender shell, which has an ivory hue at first, is sometimes used for carving, but it becomes yellowish after a time."

A modest but interesting industry is carried on at Udayagiri in the Nellore district, concerning which the Rev. F. W. Stait writes as follows:—"In Udayagiri, a village of some note before the days of British rule, there lives an old Muhammadan, who twenty-five years ago used his knife with unusual skill in the manufacture of wooden sandals. As he worked he thought, and from his deliberations a wider sphere opened before him. Why not prepare wooden articles that would increase his income? So he tried his hand on the shapening of spoons and forks, watching for new ideas, and carefully copying any new design that he came in contact with. For years he and his son toiled on, barely making ends meet. But, as his skill increased, his circle of customers grew wider and wider. Dainty boxes in delicate fretwork were carved out of solid blocks. Paper-knives in many designs were prepared. Card trays, the work in which seemed more like fine lace than mere wood-carving, were put upon the market. I interested myself in the work of one who showed such a wonderful natural talent, and through my influence the articles were introduced into several business centres. At the present time Mohammed Ismail Usuff Nanobai and five members of his family are kept constantly at work, and, even with all their efforts, are unable to

meet the demand. The most interesting point in the history of this little industry is the fact that it is all the outcome of personal talent and application, for not only did Naobai carry on the work and design the articles, but he also made his own tools and instruments as the need unfolded itself. He is unable to make the boxes during the hot months, as the wood cracks under the knife."

To Mr. Alfred Chatterton I am indebted for the following note on wood-carving at the Madras School of Arts and Madura Technical Institute.

This institution owes its origin to the disinterested efforts of the late Dr. Alexander Hunter, M.D., who in 1850 established, at his own expense, a school for the promotion and encouragement of industrial arts in the Presidency. The object was to arrest the decay of indigenous arts, and to introduce new industries where the need for such was keenly felt. After a short time the school was taken over by Government, and during the fifty years of its existence as a Government institution, it has done much to achieve the objects for which it was originally founded.

Wood-carving was first started in 1877 in a desultory kind of way, and some years later, a regular wood-carving class was established with one Meenakshi Asári of Ramnád as the maistry (foreman). He was succeeded by his son R. Kalimuthu Asári, who is still in charge of the class, so that the father and son between them are largely responsible for the nature of the influence which this school has had upon wood-carving in the south of India. Although at the outset the class was not very popular, yet, owing to the demand for carved furniture among Europeans being greater than the supply, the pupils of the school were able to obtain good wages, and its popularity, in consequence, soon increased. About the same time, a metal-worker, Ramaswamy Stapathy by name, was also employed in the school to teach repoussé work, in copper and silver, of the type which is largely employed in the ornamentation of the *vahánams* which form such an important feature in all the religious ceremonies connected with the great Dravidian temples of Southern India. This repoussé work is also found on the doors of temples, on the *dwijastambams* or flagstaffs, and on the walls of the innermost shrines, the plates being usually made of copper plated with silver or gold, or, in some instances, of pure silver.

Throughout the whole period of its existence the wood-carving department of the school has been devoted to the ornamentation of European furniture. The frame-work or structure is that of the modern cabinet maker, but the ornamental details are adapted from Dravidian models. Ebony and sandal-wood carving have always been done, to some extent, under the superintendence of native experts in this particular line. But the great bulk of the work done in the school has been in teakwood, and blackwood or "rosewood" (*Dalbergia latifolia*), more particularly the latter. Copper repoussé panels in blackwood frames are an exceedingly effective combination, and have been largely employed in the furniture manufactured by the school during the last fifteen years. It is an unfortunate fact that, of the earlier work done in the school, but few photographs or drawings have been preserved, and all the illustrations are of work done during the last two years, and the majority from the specimens of wood carving specially prepared for the Delhi Durbar Exhibition. The general features of the style of wood-carving are directly copied from the stone temples of Southern India. These latter are almost entirely constructed of crystalline rock, which is obtained from the quarries in large slabs or long pillars by the burning process. Such material lends itself regularly to a type of construction which is still more easily carried out with wood, so that there is nothing incongruous in the reproduction in wood of the stone carvings of Dravidian temples. The origin of this style of architecture is lost in the mists of antiquity, but it is known that at a very early date the principal features had become crystallized in a series of rules for construction, contained in a set of treatises collectively known as the Silpa Sastras. Of these books there were apparently thirty-two principal, and as many subordinate. The majority of these treatises have disappeared; but from such as still remained, Rám Ráz, a native of Tanjore, produced a valuable essay on the architecture of the Hindus, which was published by the Royal Asiatic Society more than seventy years ago. The Hindu orders consist of four principal parts, viz., (1) the *upapitha* or pedestal; (2) the *athisthana* or base; (3) the *sthamba* or pillar; and (4) the *prastara* or entablature. Of pedestals there are three kinds: the first is called Vedi Bhadra, the second Prati Bhadra, and the third Mancha Bhadra. Each of these is again divided into four sorts, making in all twelve, each differing from the other in its formation and in ornamentation. Of bases no less than sixty-four are enumerated in the Manasara, whilst of pillars there are seven kinds, but the entablature of the Indian order admits of but little variation. Hindu architecture reaches its highest flights in the construction of *vimánas* or pyramidal temples, and in *gopurams* or gateways consisting of from one to sixteen storeys, each storey being a complete representation of a Hindu order. Elaborate rules have been framed, regulating the proportions of the various parts. On Plate 56 are given typical sketches of bases, entablatures and pedestals modified to suit wood designs, with the names of the various mouldings. On Plate 57 is a sketch of a *mantapam* showing two pillars of typical designs; also the elevation of a wooden *vimánam*, showing

how readily the stone carving of Southern India lends itself to reproduction in wood. Plate 58 is from photographs of two large sideboards recently constructed at the School of Arts. The lower portion corresponds to the pedestal, the framework upon which it rests being the *upana*, the cupboards the *cantha* or neck, and the mouldings round the sideboard to the *pattica* or *capota*. In large structures it is usual to sub-divide *cantha* into bays by the insertion of pilasters carved into the form of *yális* or rearing horses, and advantage has been taken of this to break up the elevation of the bays to form the cupboards and recesses. The upper part of the sideboard in Plate 58 is derived from a *mantapam* with a flush top, and the lower one is from a *vimána* of a single storey. The main feature of the latter is a central *vimána* with a subsidiary one on either side. The bases of the pillars are relieved with carvings of Ganésha, Natarája, Mahakali and Krishna. The central panel of copper repoussé work represents Subrahmanya on his peacock. In the lower sideboard represented on Plate 58 the figures are Sankara, Narayan, Bráhma, and Parthasarathy. In the central *vimána* Siva, the lord of destruction, rides on his bull in the place of honour, attended on one side by Ganésha astride a bandicoot, and on the other by Subrahmanya mounted on a peacock. In the smaller *vimánas* the presiding deity is Sri Ráma.

As already stated, there are seven orders of pillars, varying from six to twelve diameters in height, from base to capital inclusive. The pillars may be of any shape—circular, square, pentagonal, hexagonal, and so forth. The base is generally square, with sometimes a *kalása* or water-pot. A *nágabandam* surmounts this, and carries the pillar, the middle portion of which has a simple ornament called the *malaikattu* or garland band, or a more ornamental *kalása* with mango leaves and a cocoanut on it. Surmounting the pillar and carrying the entablature is the capital decorated with a series of mouldings similar to those used on the pedestals. In Plate 60 is shown a lampstand in blackwood, which is a fair example of how an article of modern furniture has been derived from the Hindu orders. The lower part with the projecting *yális* corresponds to the entablature, and carries the column which corresponds to the base and pillar, and is surmounted by a small table corresponding to the entablature. In Plate 60 are shown a sideboard and cabinet of European form, but with all the ornamental details derived from Dravidian architecture. In Plate 59 are screens, the framework being of blackwood elaborately carved, and the panels of copper repoussé work.

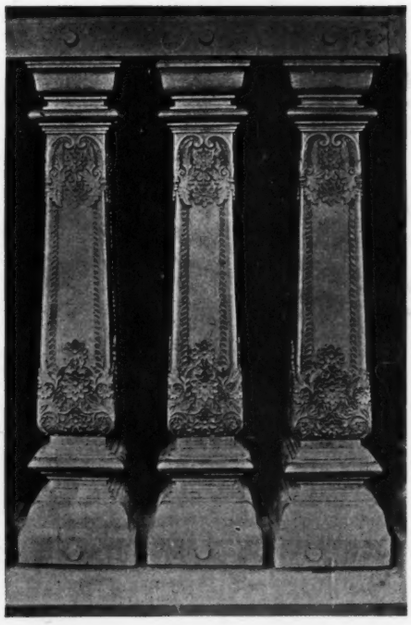
Madura is a noted centre of indigenous art handicraft, which has survived from the days when the town was the chief city of the south of India. Then craftsmen were attracted from far and near, and each brought with him his own peculiar style. In process of time these various styles have become merged into what is now a blend characteristic of the town. This is peculiarly so with the wood-carving, which is celebrated for its boldness of form, due to the influence of the stone-carvers; for its delicate tracery on flat surfaces, probably first introduced by men from the Bombay side; for the fine carving of panels decorated with scenes from the legend of the Máhabaratha; and for the excellent modelling of the *swámis*, which suggests the influence of sandalwood carvers from Mysore and Western India. At the present day the best work is done in the Madura Technical School, an institution maintained by the District Board, which has done much to revive decadent art industries, and, by finding new markets for the productions of the skilled art workmen, has encouraged them to maintain the old high standard of work.

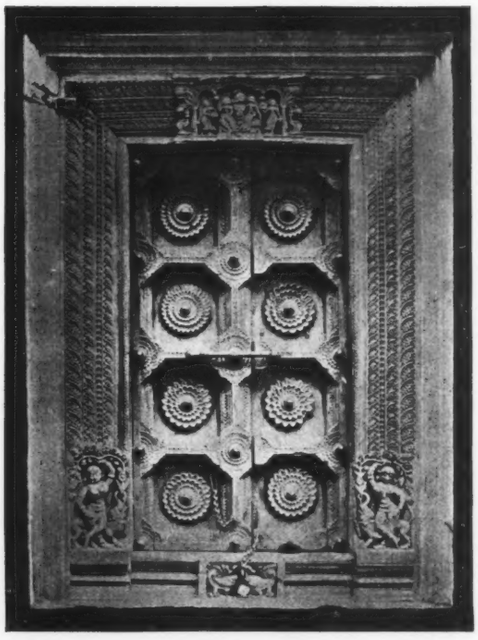
LIST OF ILLUSTRATIONS.

52, 53. Sandal-wood carving. 54. Inlaid door; top of casket; carved pillars and door. 55. Carved panels; Travancore architecture. 56, 57. Types of Hindu carving. 58. Carved sideboards. 59. Panel and wood-carving. 60, 61. Wood-carving, Madras School of Art.

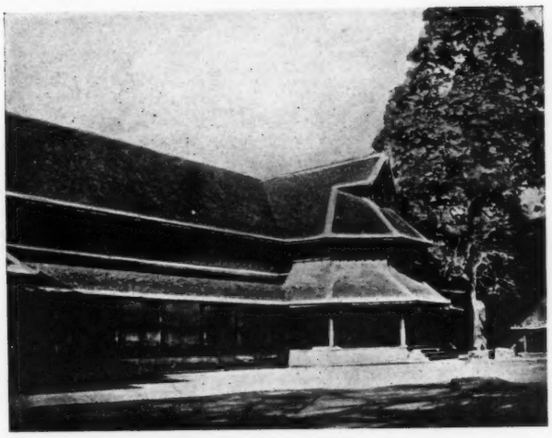
52.—Sandal-wood Carving, Mysore.

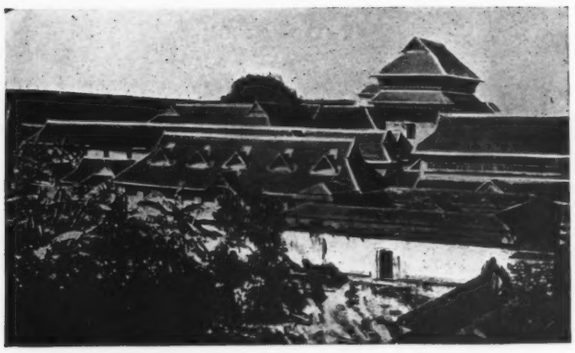
53.—Sandal-wood Carving. Mysore.

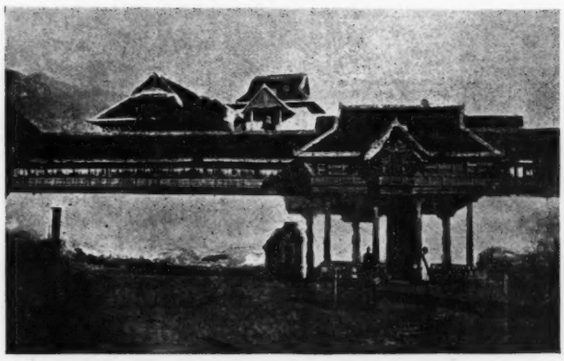


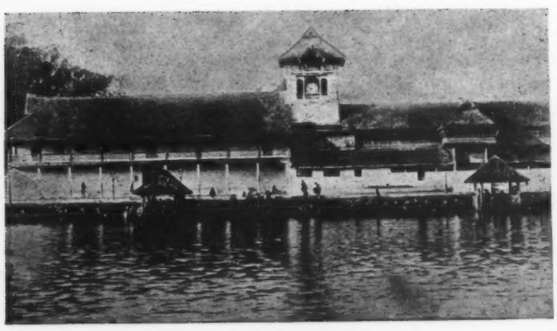


54.—Ivory Inlaid Door and Top of Sandal-wood Casket. Mysore.
Carved Pillars and Door, Mysore Palace.

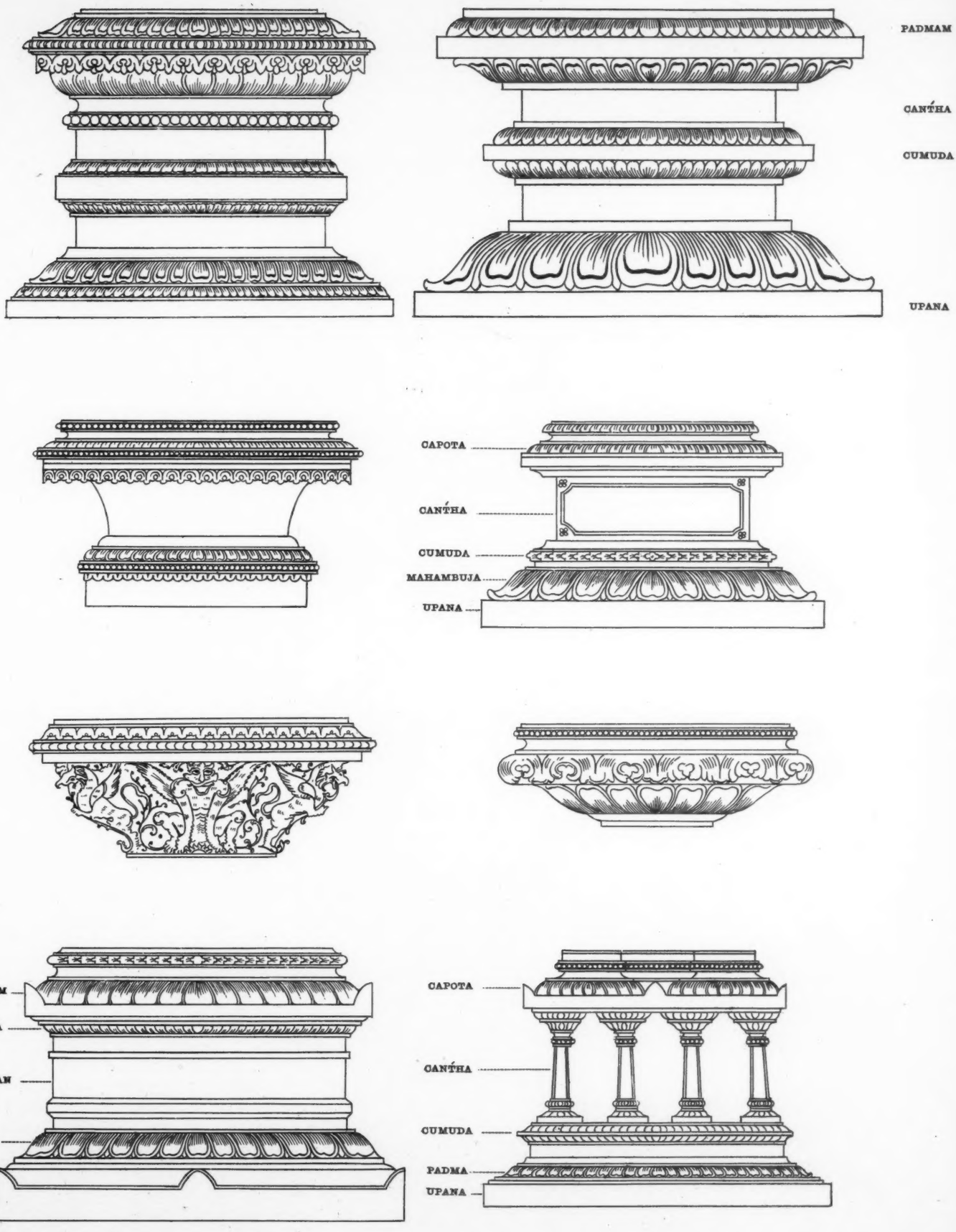




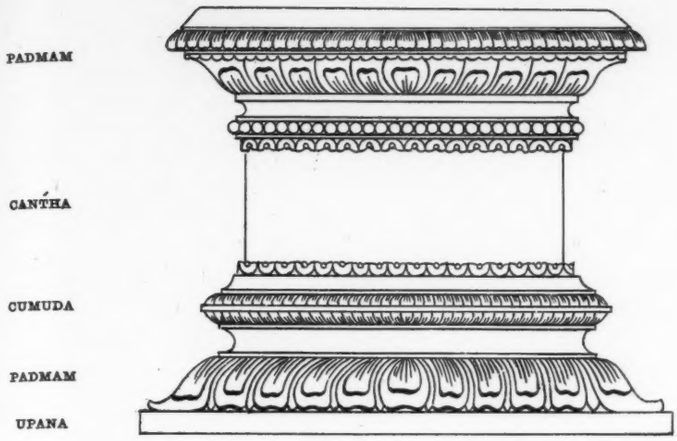


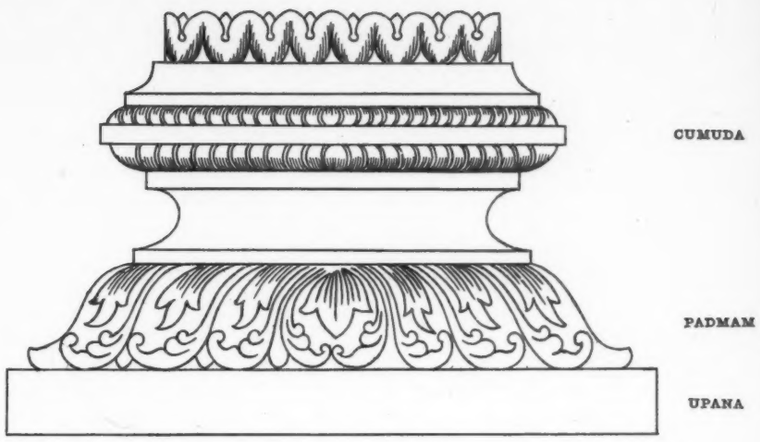


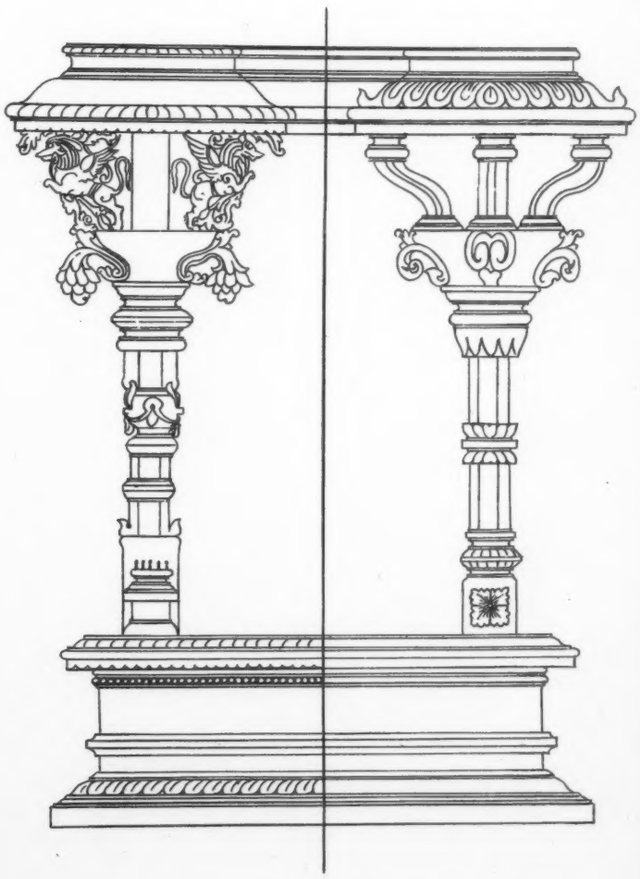
55.—Carved Panels over Doors. Mysore Palace.
Travancore Architecture.



56.—Types of Hindu Carving, Mysore.

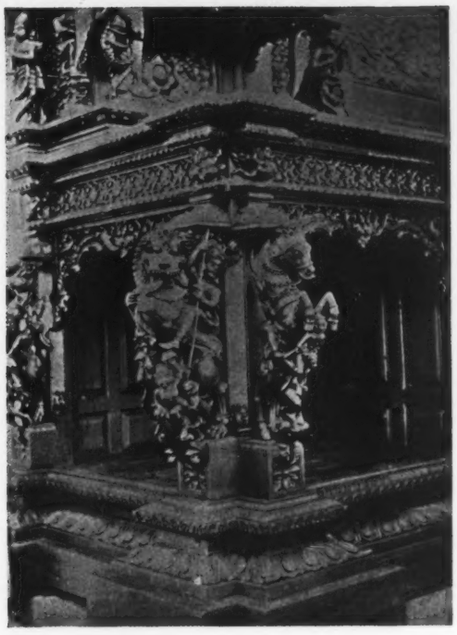


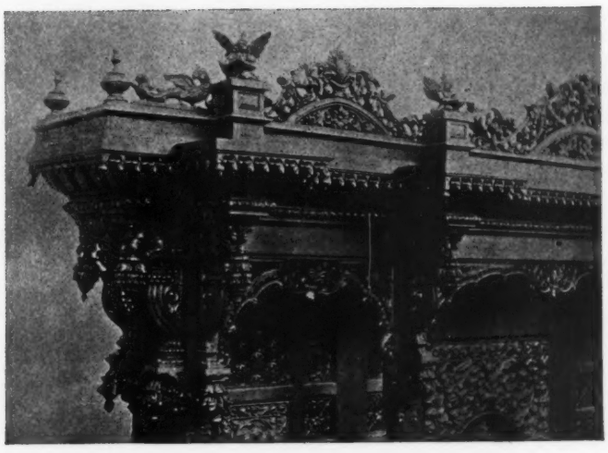


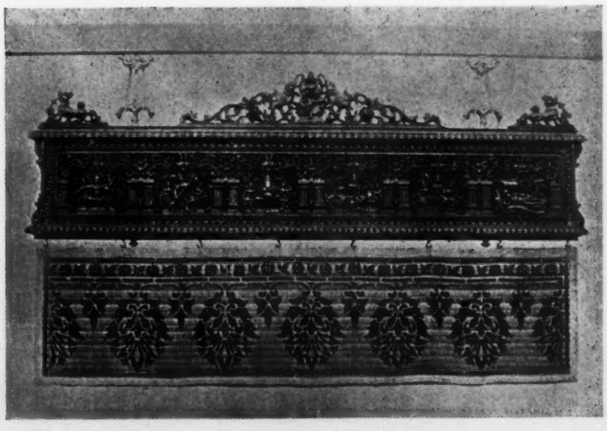


57.—Types of Hindu Carving, Mysore.

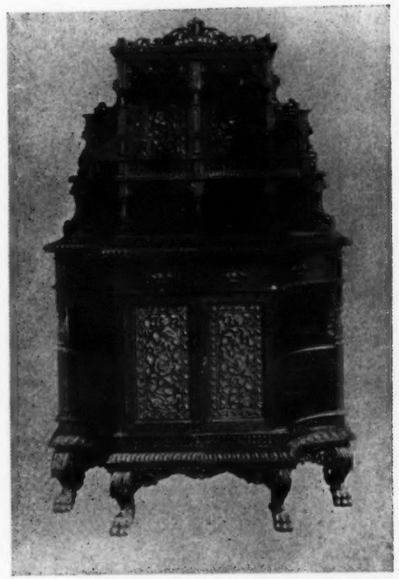
58.—Carved Sideboards, Madras School of Art.

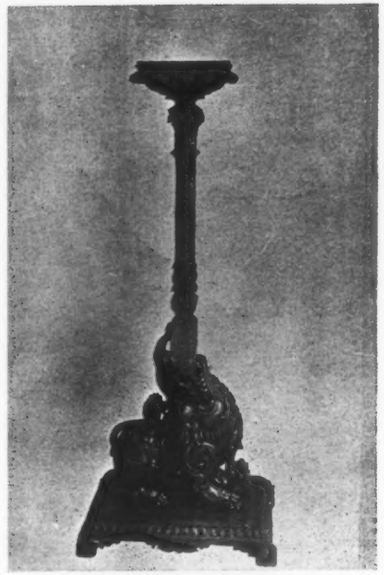


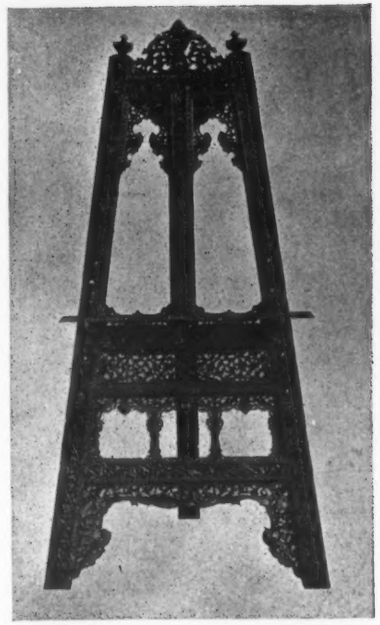




59.—Copper Repoussé Panel and Wood-Carving. Madras School of Art.







60.—Wood-Carving. Madras School of Art.

61.—Wood-Carving. Madras School of Art.

The Journal of Indian Art and Industry.

THE ELEPHANT IN INDUSTRY AND ART.

By F. H. ANDREWS, Esq.

(*Lately Principal of the Mayo Technical School, Lahore; and Curator of the Punjâb Central Museum*).

That the elephant, by reason of its inherent qualities of impressive bulk and strength, has ever been an attractive entity to man, there is abundant historical and archaeological evidence; and had it not possessed the additional attributes of tractableness, gentleness, and remarkable magnanimity, doubtless it would have occupied a great and dominating place among the evil monsters of Eastern mythology. But these amiable qualities, while holding the elephant exempt from any general imputations of evil, have also denied it the respect engendered of fear, and have acquired for it a somewhat lower regard than a more malevolent reputation might have secured. It was only natural that its great strength should be turned to profitable account by the dominant race, and accordingly the elephant has been used from time immemorial, as a vehicle and a combatant in peace and war, and to-day is extensively employed in Burma and elsewhere in hauling and stacking timber, and furnishes a most valuable means of transport over difficult country. It would appear from recent Board of Trade returns that, as an ivory producer, the Indian elephant (*Elephas indicus*) has but limited value in comparison with its African cousin (*E. africanus*), and the law that now prohibits its indiscriminate destruction for the sake of the small quantity of good ivory obtainable, or for mere sport, is a timely one. The skin does not in either species appear to have any value, and although it has occasionally been tanned, one may gather from the silence observed on this subject, by all those concerned with the commercial care of the animal, that the value of the resultant leather is not commensurate with the cost of tanning. Elephant hunting in India is therefore prosecuted on a very small scale.

The elephant formerly ranged over a much more extensive area in India than at present, but, owing to the interference of man, it has been driven to limited tracts of forest in Coorg, Mysore, Travancore and Orissa, and the lower hills of the Himalayan range to the north-east. It does not favour low-lying country, preferring quite considerable altitudes, so that they provide shady woods where tender young shoots of bamboo, wild fruits and succulent elephant grass (*saccharum spontaneum*) may be found; where overhanging branches and bushes lend him *chauris* wherewith to brush irritating flies from his sensitive skin, and where pools of good water are near for the frequent bath and cooling drink. He is very nervous and, owing to somewhat limited vision, displays in his wild state the utmost caution in his movements and is very easily alarmed. He depends for protection against surprise principally upon his senses of smell and hearing, which are very acute; and Sir J. Tennant says "their power of smell is so remarkable as almost to compensate for the deficiency of sight. The herd are not only apprised of the approach of danger by this means, but when scattered in the forest, and dispersed out of the range of sight, they are enabled by it to re-assemble with rapidity."[1] It is necessary, therefore, when hunting elephants, to track them very warily, considerable skill and experience being required to locate the herd without alarming them. When located, beaters are employed to drive them towards the *keddah* enclosure, by gently tapping their axes on the trees or making other signs of their proximity without actually discovering themselves to the sight of the quarry. The *keddah* "consists of a tolerably regular quadrangular figure containing probably 150 acres and surrounded by a trench one mile and a quarter in length and generally about eight feet wide and deep. . . . The trench is discontinued at the points where it would cross the elephants' paths. . . . In place of the trench at these points are ponderous gates made of logs, which, when not in use, are hauled up between trees, which serve as gate-posts. . . . The gates . . . being kept open at ordinary times the elephants pass along their accustomed paths, or rest or browse in the inclosure, unconscious that the former may be closed and the latter be turned into a prison on some fatal day."[2] Within this is constructed a smaller enclosure of strong fencing or ditching, towards which a funnel-like run is arranged. When all are within the outer enclosure the gates are dropped and secured. Subsequently the animals are driven into the inner stockade by way of the funnel-like approach and a strong gate is closed upon them.

The hunters then proceed to tie up the captives, assisted by trained elephants called *kunkis*, who play a very important part, and are said not only to exhibit a keen appreciation of the whole business, but also to thoroughly enjoy their work. The first object is to secure the hind-legs by tying them together, and then to treat the fore-legs in the same way, and in order to prevent the animal having freedom of movement during the process, two *kunkis*, each bearing a *mahaut* and a "nooser," quietly sidle up to the captive selected and, with assumed innocence, place themselves one on either side—heads towards the tail end of their victim—and close up tightly, so

[1] When looking over the exhibits sent from India to the Paris Exhibition of 1900, I could not but admire the large collection of imposing enlarged photographs giving vivid pictorial details of the mode of capturing and taming of the Indian Elephant by the Mysore State. I afterwards applied to the India Office for permission to use some of these photographs to illustrate one number of the *Journal of Indian Art and Industry*, with an account of the industrial side, and in the following number, the art side of the Indian Elephant. My application to the India Office was granted, and I hope these two numbers (Nos. 87 and 88, completing Vol. X.) will not be lacking in interest.—W. Griggs.

[2] *A Narrative of Elephant-catching in Mysore*, by G. P. Sanderson, 1891.

that, by reason of the aldermanic disposition of their bulk, the middle one is held as a wedge between two reversed wedges, rendering forward movement impossible, and any effort to retreat easily repressible by the trunks of the *kunkis*. The noosers now drop to the ground, and at the first opportunity slip the noose of strong but loosely twisted jute rope under one foot, pull it up tight above the ankle joint and bind the other to it. Sir J. E. Tennant tells, as an instance of the *kunkis*' understanding of the process, how a nooser having made several ineffectual attempts to slip the noose, the captive each time dropping his foot down too quickly, one of the *kunkis*, appreciating the difficulty, the next time the foot was raised slipped his own underneath and held it there until the rope was adjusted. These trained elephants never lose their temper, show the utmost tact and endeavour to disarm the suspicions of the victim by their casual and innocent demeanour, while yet keeping a very watchful eye to the business in hand; and when the trick is done they chuckle over the matter—that is, they swing themselves about in delight, flap their ears, and lift up dust and loose earth and scatter over their bodies—patting themselves on the back, as it were.

After being hobbled, the captive is tied to a tree. It is necessary to allow him as little rope as possible; and to draw him up tightly, the noosers "take a turn" round the tree and, as the *kunkis* bring the elephant nearer by wedging him up on either side, while a third butts him convincingly in the rear, they haul in the slack. In this process an elephant will sometimes be troublesome, and on an occasion recorded by Sir J. E. Tennant, when one succeeded in getting the rope twisted a few times round the tree so that it locked and would not haul, a *kunki*, seeing what the trouble was, put his forehead against that of the captive and firmly pushed him backwards round the tree until the rope was clear again.

After quieting down, the new captive is taken to bathe and drink. He is dressed in a strong harness of rope and is attached by three long stout traces to the same number of *kunkis*. The arrangement is triangular, the *kunkis* being the angular points and the captive the centre, so that breaking away is impossible, and yet a certain freedom is allowed. Upon his return from the bath, he is secured in the elephant lines, where, after some more ineffectual struggling, he at last becomes more reconciled, and the trainers proceed to accustom him to being handled and to teach him what a *mahaut* is, by placing the human yoke upon his neck.

Many instances have been recorded of the elephant dying of a broken heart when he has been subjected to severe ill-treatment or injustice, and it behoves those who have charge of these sensitive and affectionate creatures to treat them well. No animal is more appreciative of kindness, none more distressed by unfair treatment.

When a captured elephant injures himself by his struggles so seriously that he dies or has to be killed, his great body is consigned piecemeal to the fire. His spirit returns to Brahma, perhaps to be reincarnated in the body of a *mahaut* in its next birth as a reward for its sufferings in its erstwhile tenement!

In India, when an elephant is killed, parts of the flesh are sometimes eaten, and the foot is even considered a delicacy. The African natives are fond of the flesh of their elephant and used to hunt it solely for food, neglecting the ivory as profitless bone. But these must have been savages far from the reach of even the echoes of civilization, for ivory and bone have been in demand for the Arts from a very early date, and Herodotus says the Ethiopians brought elephant tusks as part of their annual gift to King Darius, while Marco Polo records his astonishment at the great trade in ivory carried on at Zanzibar.

In Eastern literature the elephant is constantly slipping from the pen of the poet. It is customary with us to cite the elephant as the type of heavy ungainliness, and we quote the Bard's only reference:

> "The elephant hath joints, but not for courtesy;
> His legs are legs for necessity, not for flexure."

The Eastern poet, on the contrary, with more intimate knowledge of his subject, finds in the elephant his synonyms for the superlative of strength, grace and symmetry. The soft and graceful gait of an Indian woman is likened to that of an elephant; and in the East, where a woman's garments permit freedom of movement and sympathetic co-operation of the muscular system this is an apt comparison. In the west the natural swing of the hips, only possible in conjunction with the free, lithe play of the muscles of the foot and torso, is restricted and becomes jerky. The divinely exquisite Sita (surely one of the sweetest characters in any literature, over whose abduction by the lord of Lanka such fearful carnage ensued) possessed "thighs like the trunks of elephants." And the lord himself, the Rakshasa god Ravana, although an evil person addicted to wine and very quarrelsome, was still god-like in the majesty of his form, and he had "fingers like the trunks of elephants."

The elephant has an exquisite sense of balance and most supple joints, and can even make obeisance with profound dignity. The sense of weight and balance is exhibited in his manner of stacking timber in Burma, in the way he passes things up in his trunk to the *mahaut*, and in his extreme caution in walking over structures of doubtful strength. In Plate 84 the elephant is testing the strength of the flap of the truck let down as a bridge for him, and by his long stride seems to prefer to trust the solid ground. The grace of action of the right fore-leg is as lithe and delicate as the movement of a cat. In feeding, he picks up his food with the utmost daintiness,

weighting it to a nicety and gently knocking the dust out of it on his fore-feet, and decorously places it in his mouth.

By its general tolerance of man and its interest in human affairs, even to the enjoyment of some of its little vanities, the elephant has acquired in the East a position of *camaraderie* rather than of worshipfulness, except when, by a special favour of the gods, it is presented to the world in its albino form. As a white elephant it commands a most exalted position spiritually and temporally, for in its beautiful body has not the holy spirit of Buddha vouchsafed to be incarnated! It is, therefore, a greatly coveted object of possession, and in the 16th century was the *casus belli* of a prolonged struggle between the States of Siam, Pegu and Aracan, wherein five kings and many thousands of fighting men were killed. In temporal rank the white elephant took precedence of the heir apparent.

Nor is the elephant quite excluded from the circle of the Hindu Pantheon. As the good-natured and domesticated god Ganeśa he has just managed to get his head into the celestial community, for his body is after man's image. And this came about quite accidentally, according to a popular version of the matter which Mr. Lockwood Kipling characteristically gives as follows:—

"During one of the absences of the great lord Shiva, Parbati, his wife, taking a bath rubbed some tiny pellets off her skin and amused herelf by moulding them into the form of a child, till at last she breathed life into it. Shiva returned and was outraged to find a baby where no baby should be, so he promptly cut off its head with his sharp war quoit. Then Parbati explained, and Shiva said in effect: 'Dear me! this is very sad, why did not you speak sooner?' Then, catching sight of an elephant standing near, he cut off its head and clapped it on the decapitated baby. 'Now it's all right,' said he, 'I was always rather hasty.'"[1]

But as a reminder that in its distinguished position proper deportment is required of it, an *ankus* (elephant goad), placed in one hand of the son of Parbati, is ever held before the eyes of his incongruous head.

Another version of the affair is that upon the birth of their son, Shiva and Parbati, being very proud of it, issued invitations to their celestial neighbours to come and admire the baby. By an unfortunate mischance the god Sani was forgotten but uninvited came, and, in a towering passion, threw one scathing glance upon the innocent child's head with such fierce energy that it fell off! The assembled guests in dismay, frantically seeking to discover a remedy for this untoward calamity, came upon an elephant sleeping with its head towards the north. Something about this circumstance seems to have presented an obvious solution of the difficulty, for they at once struck off the head of the sleeping monster, and before the distracted mother could protest, or even understood their object, her decapitated darling was mended.

In reading the *Mahabharata* we are impressed by the great numbers of war elephants (especially when they are mad ones!) accompanying the contending armies; and the magnificence of pageants is convincing when we read of the hundreds of elephants bearing gold and silver howdahs, and gleaming and glittering with jewels set in their gorgeous trappings. The remarkable display of elephants at the recent great Durbar held by the Viceroy, Lord Curzon, on the historic plain around Delhi, recalled the glories of the pageants of the god-like Pandavas held in the heroic age in the same vicinity.

It must be admitted that the elephant shines best in peaceful functions. Even as he hath graces comparable to those of a woman, equally feminine and more human is the joy he experiences in being dressed to go out. Deck him in "rich and gay housings of inlaid cloth," in velvet and cloth of gold, gilded chains suspending melodious bells and tinkling trinkets, gold and silver howdah like a small tower, jewelled carcanet and chaplet, and jingling bangles: festoon him all about with variegated silken cords with dangling tassels, and finally paint his face in the approved mode, and he will be supremely happy. But, an you love him, do not ask him to fight. He is a creature of peace, and war worries him. That he has been known to fight well and show extraordinary bravery there seems little doubt, and among the ancients in the East he was much sought after as a powerful adjunct to their armies. So much so that the Assyrian queen Semiramis, in default of the real article, caused to be constructed numbers of artificial elephants, which were carried to battle on camels; and not entirely without success, for the horses of the opposing host, accustomed to elephants, advanced boldly enough against the "property" ones, but retired in a shockingly bewildered state of mind when they scented the pungent fetor of the hated "*oont*" under the respectable form of the elephant. Akbar, also, in storming the fort of Chitor, took with him 300 elephants who literally trampled the Rajpúts "like grasshoppers under their feet." But the experience of Porus, who took his army of elephants to resist Alexander on the banks of the Hydaspes, when in their mad retreat they trampled and destroyed the warriors they came to support, was similar to that of the king of Mien (Burma) when his two thousand war elephants, "on each of which," says Marco Polo, "was set a tower of timber . . . carrying from twelve to sixteen well-armed fighting men," broke and fled before the arrows of the Tartar bowmen, and rushed

[1] *Beast and Man in India*, by Lockwood Kipling, C.I.E.

into the woods "dashing their castles against the trees, bursting their harness, and smashing and destroying everything that was on them"; and like catastrophies happened repeatedly. It has long been realized that, except as a means of transporting commissariat, guns and other munitions of war, they are a danger rather than a help.

Pitted against one another, they will fight desperately. For the royal sport of elephant-baiting special quadrangles, like large bear-pits, were provided by the old rulers in their palaces; and from beautiful marble terraces one may still look down into the now quiet and deserted arenas, where, in the good old days, these terrific contests took place to cheer the spirits of a monarch greatly bored. Bishop Heber[1] mentions how, during his visit to Baroda in 1824, the Gaekwar offered to bait an elephant for his entertainment, "a cruel amusement, which is here not uncommon." While at Jáipur the good Bishop was "shewn five or six elephants in training for a fight. Each was separately kept in a small paved court, with a little litter, but very dirty. They were all what is called '*must*,' that is, fed on stimulating substances to make them furious, and all shewed in their eyes, their gaping mouths, and the constant motion of their trunks, signs of fever and restlessness. Their mohouts seemed to approach them with great caution, and on hearing a step, they turned round as far as their chains would allow and lashed fiercely with their trunks." Bernier describes elephant contests as taking place on the broad sands by the river at Delhi, just below the Fort, where, from their chambers, the Emperor and his principal ladies and courtiers could view them.

As a vehicle the elephant is usually reliable, seldom causing any anxiety. Through jungle he makes his own road where none exists, by his great strength and weight turning aside obstacles which, to a lesser animal, would be sufficient to arrest progress. He is a good climber, and in ascending hills, Mr. Sanderson says, always selects the best gradients; and where a slope is very steep and no other available, with his powerful toes he will cut himself a zig-zag path. Over swampy ground he is sure-footed, and he swims streams with ease. A curious accident which happened to the elephants of the Emperor Aurangzebe when on his way to Kashmir, accompanied by his court, is mentioned by Bernier in a letter to M. Merveilles in 1665. He says:—

"A strange accident cast a gloom over these scenes and damped all our pleasure. The king was ascending the *Pire-penjala* mountains . . . followed by a long line of elephants, upon which sat the ladies. . . . The foremost, appalled, as is supposed, by the great length and acclivity of the path before him, stepped back upon the elephant that was moving on his track, who again pushed against the third . . . and so on until fifteen of them, incapable of turning round or extricating themselves in a road so steep and narrow, fell down the precipice."[2]

Dr. M. A. Stein draws attention to the coincidence that this accident should have occurred so close to the spot where local tradition places an incident related by Kalhana in his *Rajatarangini*:—

"The Chronicle, 1.302 sqq., relates of King *Mihirakula*, whose identity with the White Hun ruler of that name (*circ.* 515-550 A.D.) is not doubtful, that when on his return from a tour of conquest through India he reached the 'Gate of Kashmir,' he heard the death-cry of an elephant which had fallen over the precipice. The gruesome sound so delighted the cruel king that he had a hundred more elephants rolled down at the same spot."[3]

The position of the elephant in regard to Art is one of considerable importance. As already mentioned, *in propria persona* he is an imposing and highly decorative feature in pageants. Pictorially he figures constantly, in all ages, in both sculpture and painting; architecturally he is variously a telemon, a cantilever, a finial, and so on; and in the ivory he furnishes he exercises universal decorative influence. The ubiquitous *makara* of Southern and Eastern architecture seems nothing but a highly grotesque elephant with a considerable strain of the mammoth and a reminiscence of the crocodile.

The elephant has a limited place in European heraldry, but occurs frequently on coins and seals, sometimes proper and sometimes as the capital element of a composite grotesque monster, or as a crest.

These matters will be dealt with in detail later.

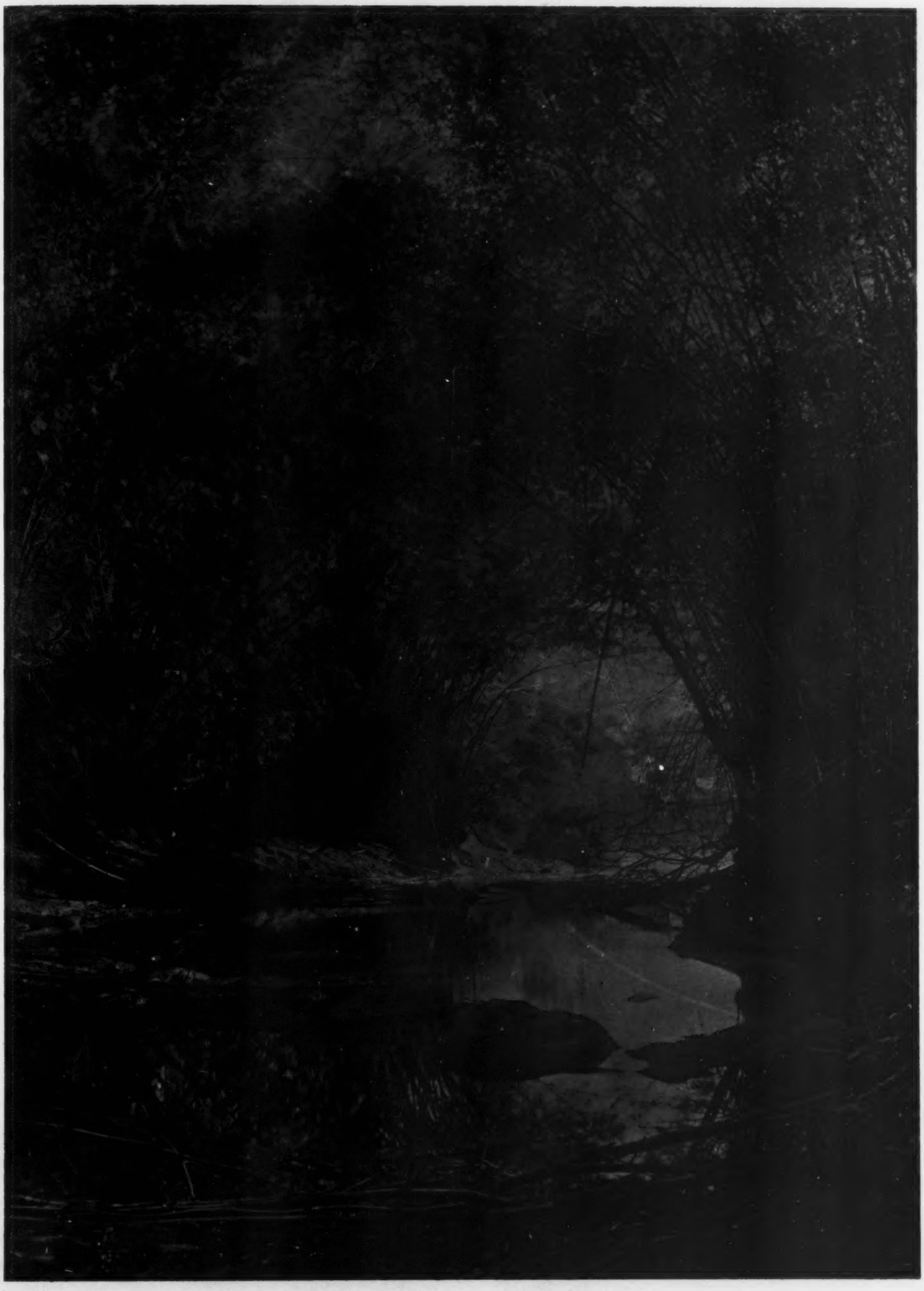
[1] *Narrative of a Journey through the Upper Provinces of India.* Reginald Heber, D.D.

[2] *Travels in the Mogul Empire.* Bernier (A. Constable, 1891).

[3] *Memoir of the Ancient Geography of Kashmir* by M. A. Stein (Calcutta, 1899).

LIST OF ILLUSTRATIONS.

62, 63, 64. Haunts of the elephant. 65. The Keddah Valley. 66. The impounding stockade. 67. Raising the gate of the smaller enclosure. 68. Sanderson's improved iron drop-gate for Keddahs. 69. The herd in the impounding stockade. 70. Preparing to charge. 71, 72, 75. Securing the elephants. 74. The elephant secured. 75. A refractory tusker. 76. Securing a young elephant. 77. Leading the captives out of the stockade. 78. The captives drinking. 79. A tusker being taken to drink. 80. The captured elephants secured in the lines. 81. Taming a newly captured elephant. 82. Holiyars burning the carcase of an elephant. 83. The elephants being entrained. 84. Unloading a tusker from a railway truck. 85. Forest tribes of Mysore: the "Kurrubers." 86. Sacrificial Ladle. 87. Ivory Casket.



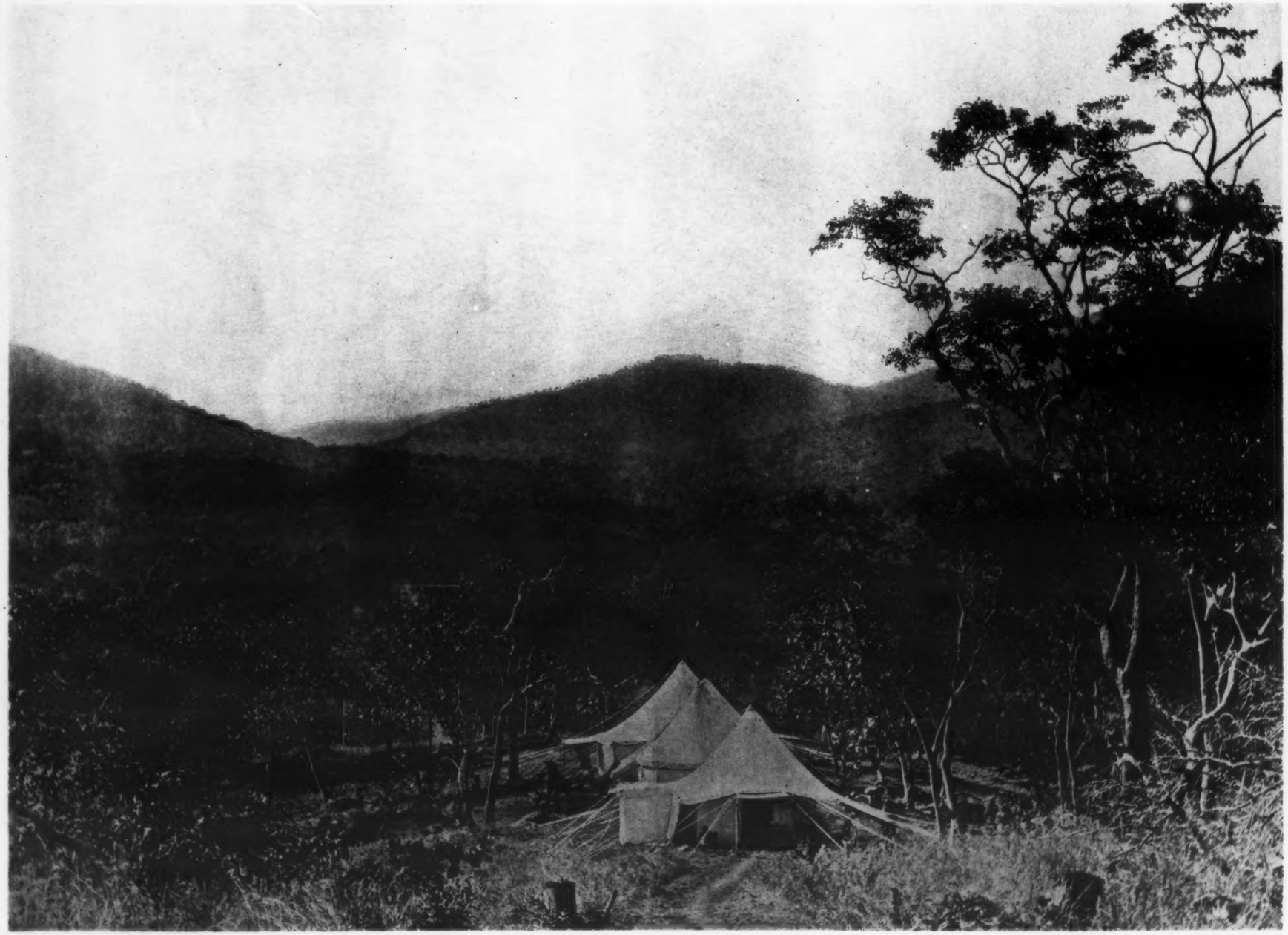
62.—Haunts of the Elephant.

The nature of the forests which elephants usually frequent.

63.—Haunts of the Elephant.

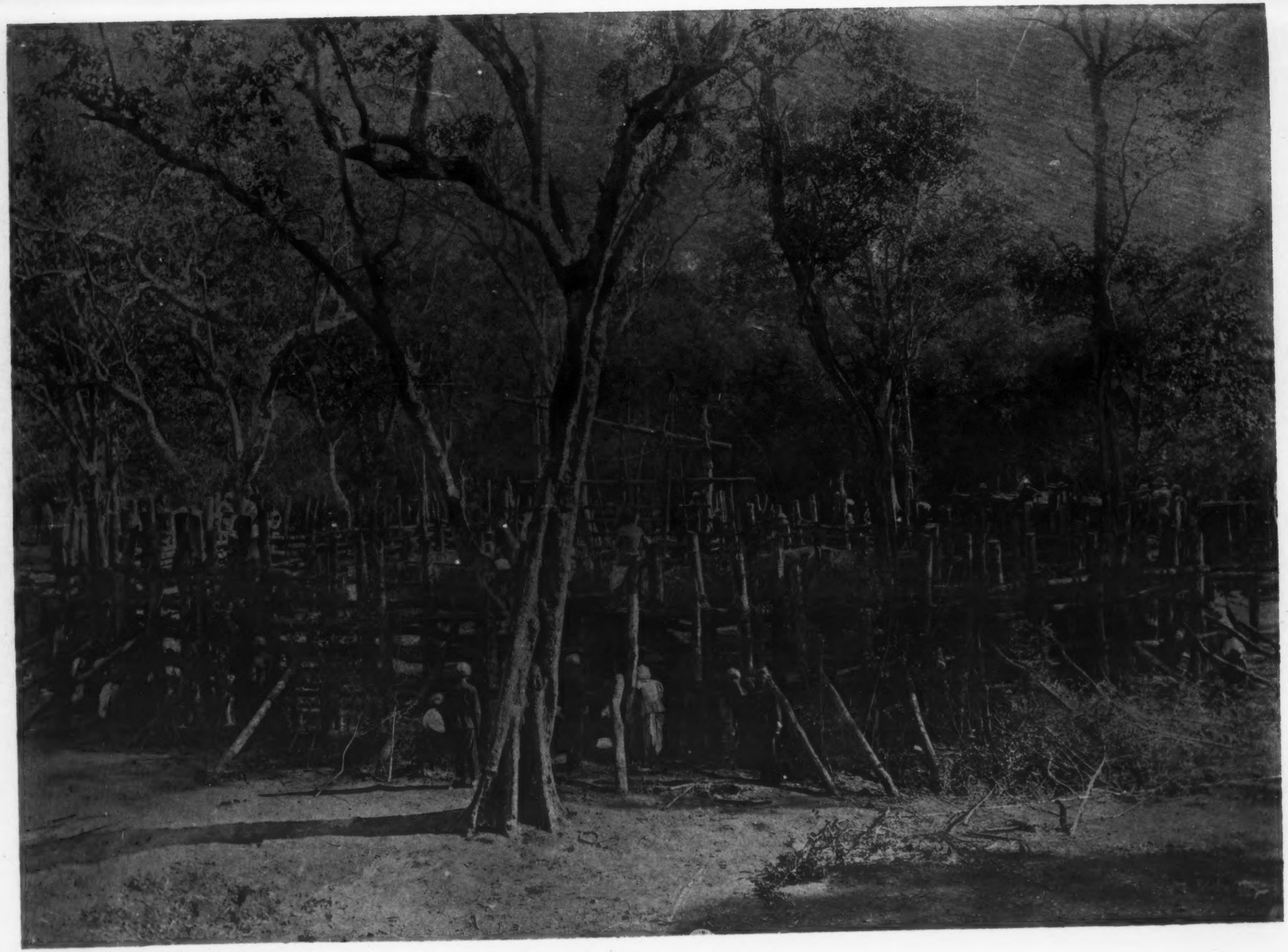
The nature of the forests which elephants usually frequent.

64.—Haunts of the Elephant.



65.—The Keddah Valley.

On information from the trackers of a herd being located, hundreds of men are requisitioned from the surrounding forest hamlets to act as beaters. They are marshalled on arrival, and on being led behind the herd by the trackers, gradually drive it towards the "Keddah."

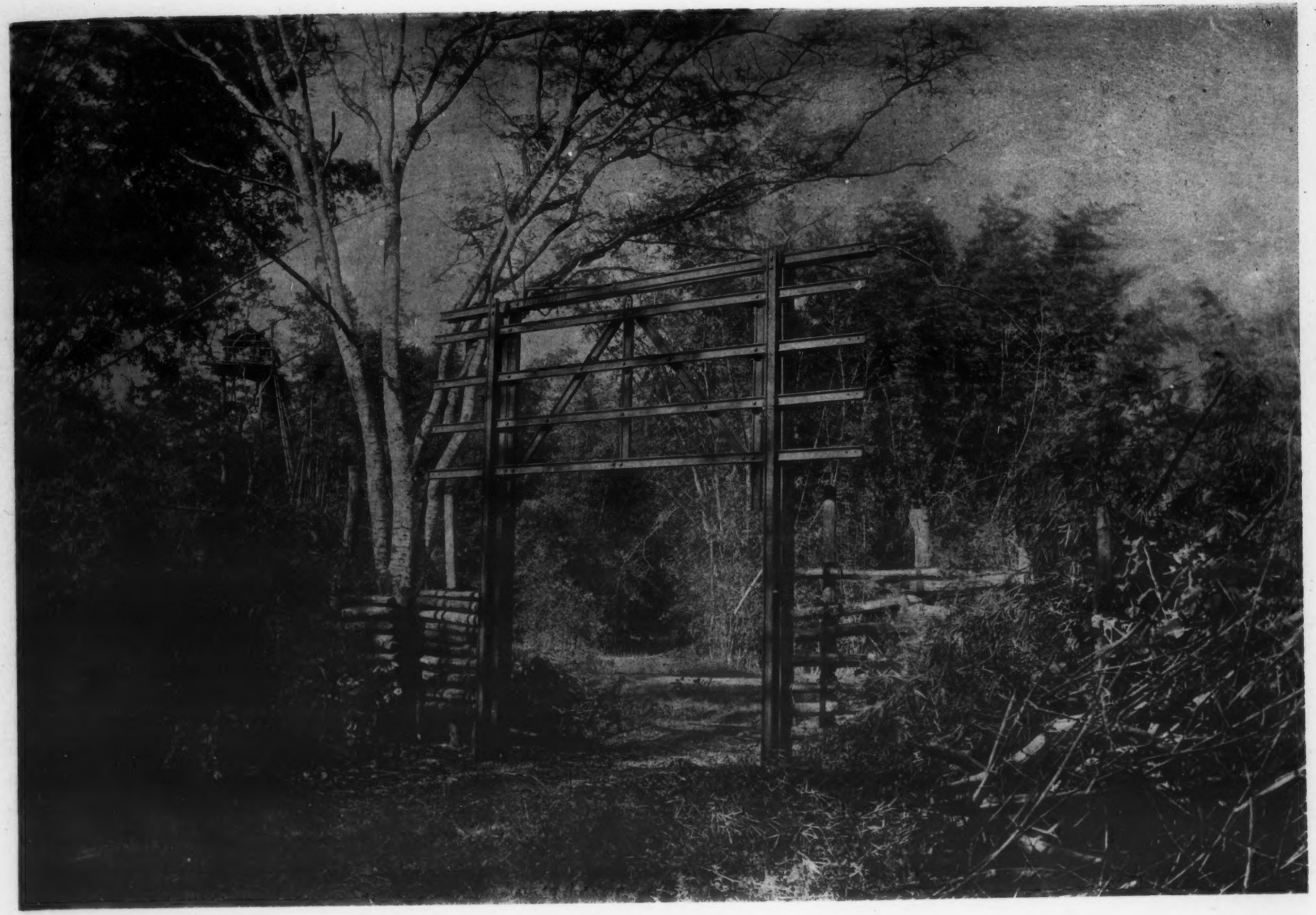


66.—The Impounding Stockade.

A "Keddah" consists of two enclosures, into the largest of which, many acres in extent, the elephants are first driven and allowed to rest for a day or so to quieten down.

67.—Raising the Gate of the Smaller Enclosure.

About fifty beaters may be seen hauling on the hawser to raise the gate. These men are representative of the major portion of the agricultural population of the State.



68.—Saderson's Improved Iron Drop-Gate for Keddahs.

69.—The Herd in the Impounding Stockade.

This shows the manner in which the elephants herd together when they are in fear of some danger threatening them. They are watching the entrance of the "Koomkies" with the "Mahouts."

70.—Preparing to Charge.

The female elephant with the calf in the foreground is prepared to be aggressive.

71.—Securing the Elephants: the First Operation,

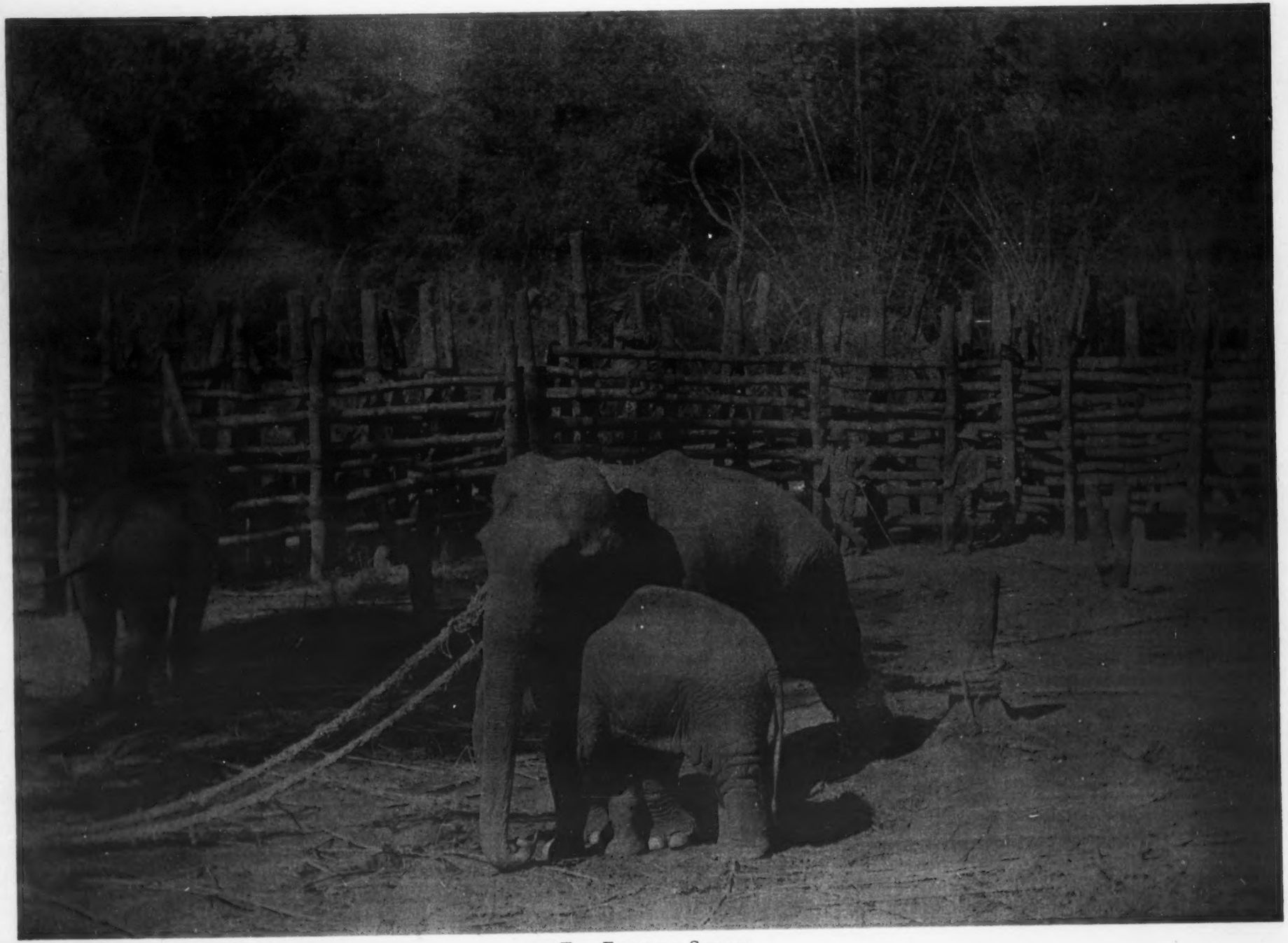
The "Koomkies" (tame elephants) so place themselves that the wild one cannot move in any direction; the "Noosers" now slip down and proceed to tie the wild elephant's hind-legs together. This is a service of great danger, as the elephant is liable to "kick" on feeling the rope.

72.—Securing the Elephants: the Second Operation.

After hobbling the elephant, a stout rope is passed round its legs. This one of the "Koomkies" takes between its teeth, and guided by the driver, drags the captured elephant.

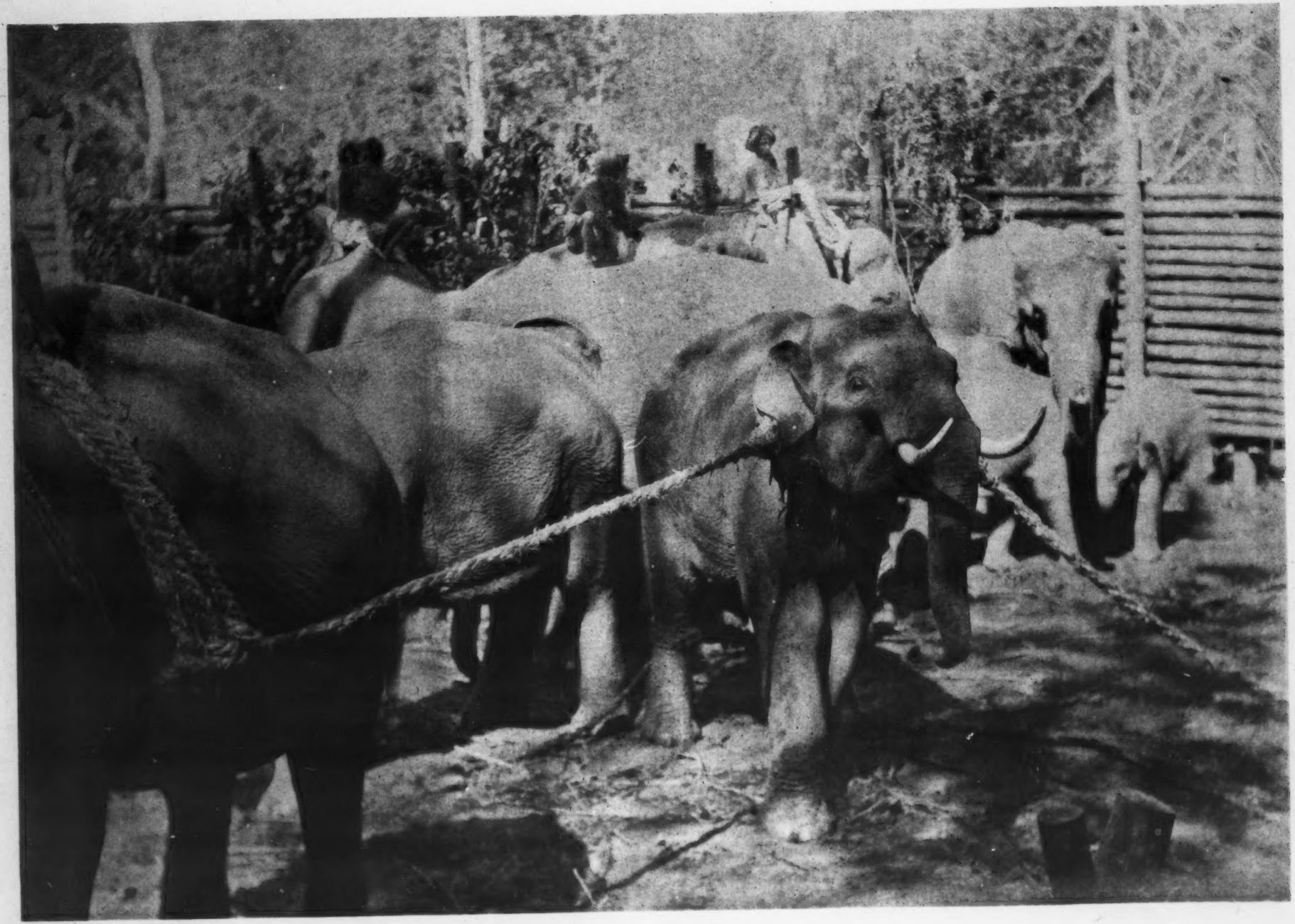
73.—Securing the Elephants: the Final Operation.

The elephant's hind-legs being tied to a tree, a stout rope is passed around its neck and the end secured to another tree. The manner of doing this is shown on the right of this picture.



74.—The Elephant Secured.

This shows the result of the three previous operations. The elephant at first strives to get free, and frequently injures itself in its struggles. The elephants are kept in this fashion for a few days, and being well cared for, they soon lose a great deal of their fear of man. The elephant in the picture is a female with its calf; these are very savage when approached by the men.



75.—A Refractory Tusker.

76.—Securing a Young Elephant.

The large elephants having been secured, the calves have to be attended to. A "Koomkis" (tame elephant) is kneeling down so as to allow the rider to pass a rope around the calf's neck.

77.—Leading the Captives out of the Stockade.

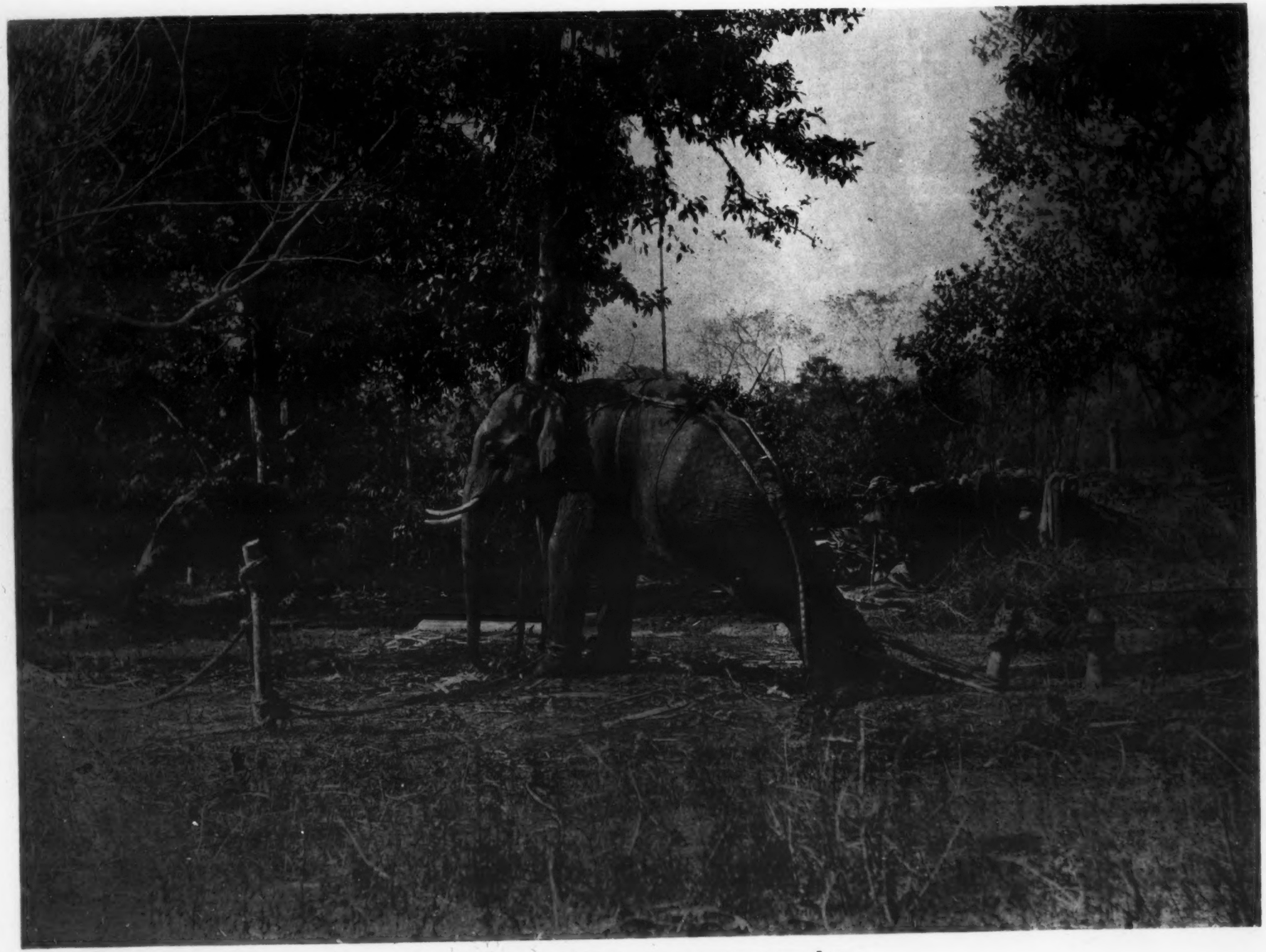
The elephants, having become accustomed to the sight of men near them, are taken down to the river to bathe and drink. The more refractory give an immense amount of trouble, and the men in charge experience a great deal of rough and dangerous work.

78.—The Captives Drinking.

On removal from the impounding stockade the elephants are taken down to the river, between two tame ones, to quench their thirst and to bathe.

79.—A Tusker being taken to Drink.

A tusker is generally vicious and takes longer to tame than a female. They are usually led down to the river by two elephants, and a rope on one of their hind legs is attached to a third elephant behind.



80.—The Captured Elephants secured in the Lines.

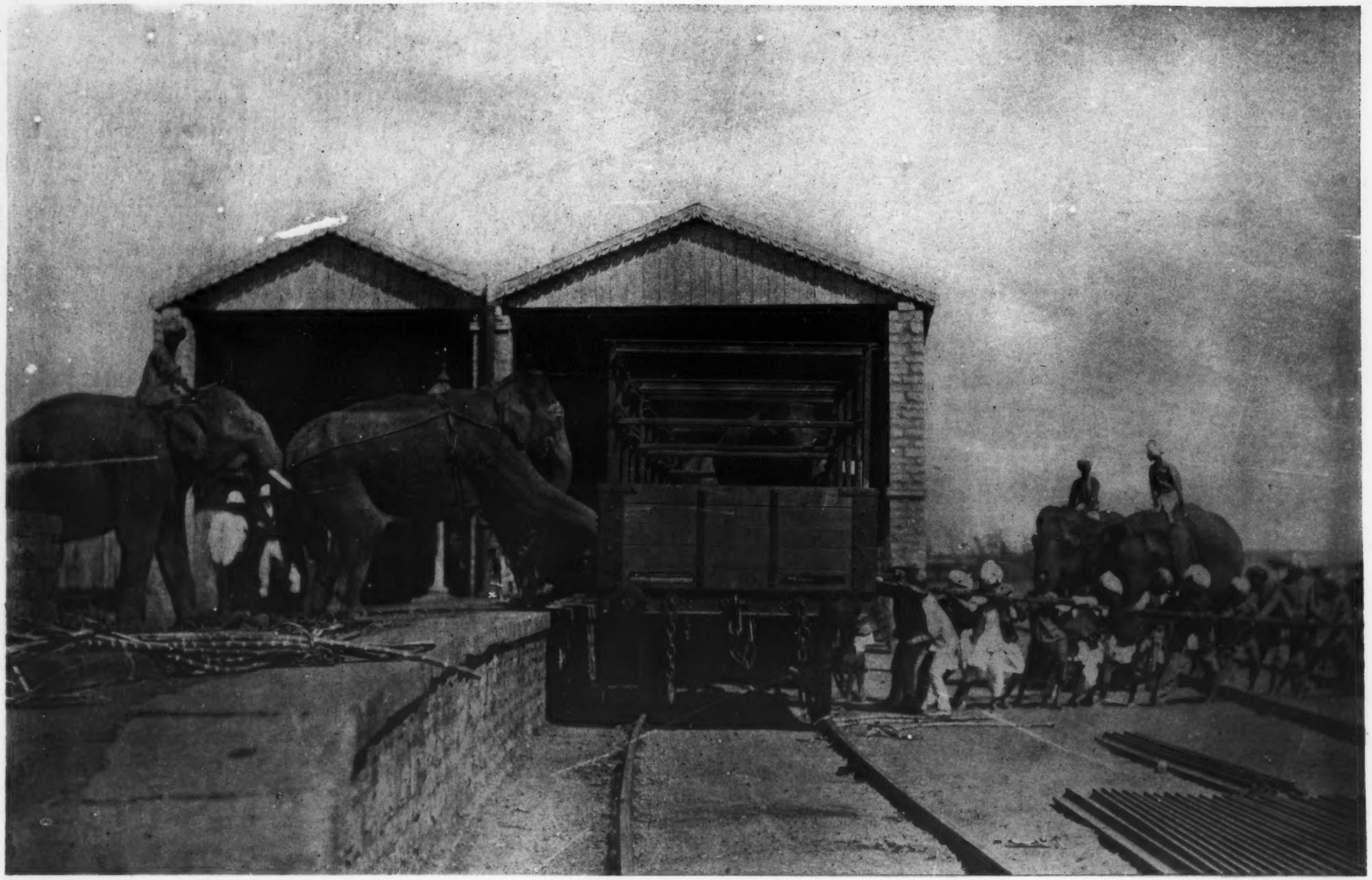
The elephants, having quenched their thirst and bathed, are taken to the elephant lines—"Peelkhana"; they usually struggle for some time before becoming reconciled to their new surroundings.

81.—Taming a newly captured Elephant.

Men with spears are stationed in front to punish any unruliness whilst the elephant is being handled and taught to bear a rider.

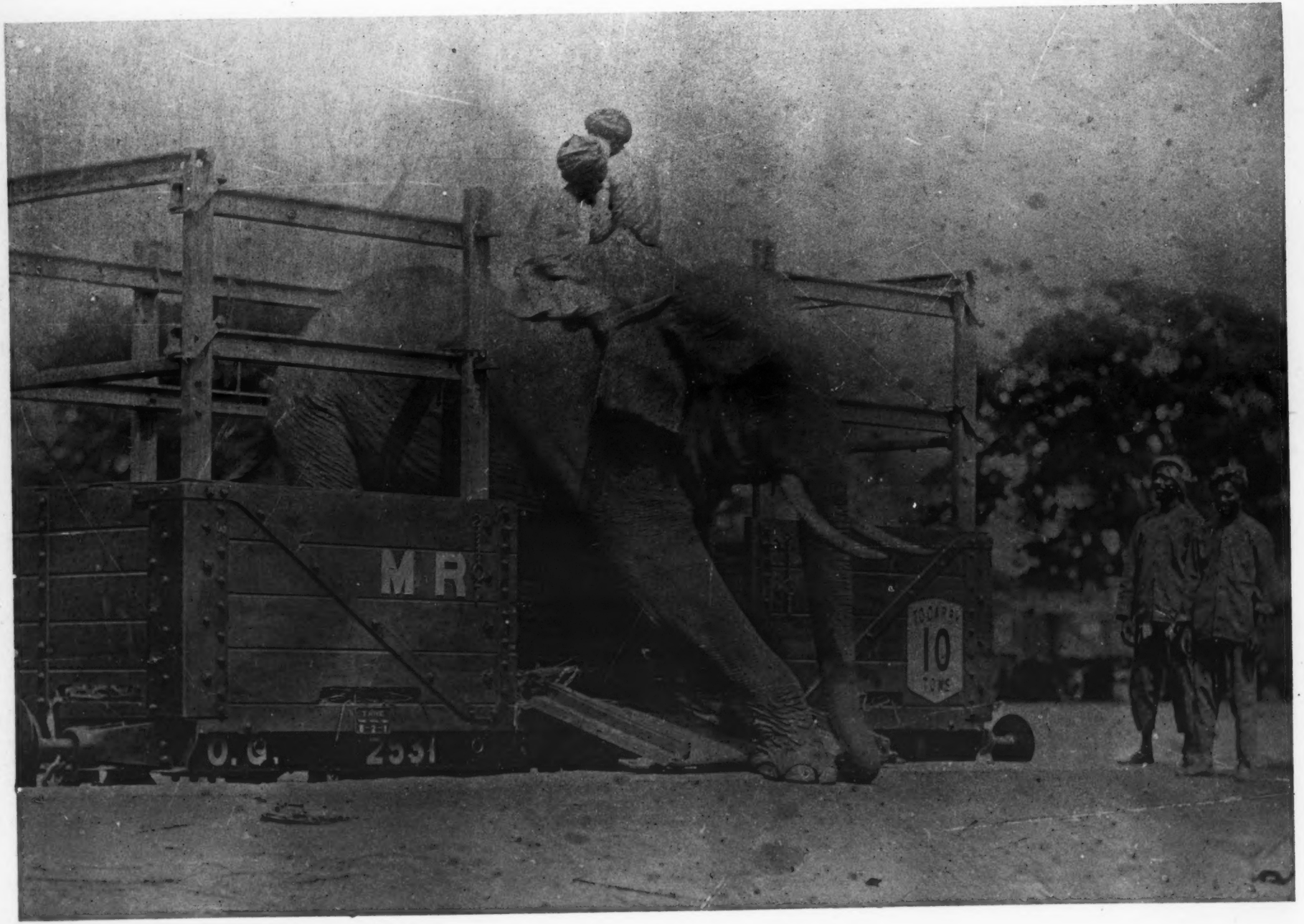
82.—Holiyars Burning the Carcase of an Elephant.

The elephants that succumb to the injuries they receive in their efforts to escape after capture, have either to be buried or burned. The picture represents a gang of "Holiyars" (low caste villagers) cutting up and burning a carcase.



83.—The Elephants being Entrained.

In a few weeks the elephants are sufficiently docile to be despatched by rail to one or other of the recognised centres for sale. For entraining, a stout rope is secured round one of the elephant's fore-legs and passed through the open side of the truck. A number of men haul on this whilst a tame tusker assists in the rear by pushing and occasional prods with its tusks.



84.—Unloading a Tusker from a Railway Truck.

A tusker in the act of walking out of a railway truck—a good illustration of the docility of a well-trained elephant.

85.—Forest Tribes of Mysore: the "Kurrubers."

PHOTOGRAPH PAINTED BY J. I. WILLIAMSON.

W. GRIGGS & SONS, LTD., CHROMO-LITH.

86.—Sacrificial Ladle. Cingalese. 18th century.

W. GRIGGS & SONS, LTD., CHROMO-LITH.

SOUTH KENSINGTON MUSEUM.

87.—Ivory Casket. Travancore, India. 17th century.

The Journal of Indian Art and Industry.

THE ELEPHANT IN INDUSTRY AND ART (II.).

By F. H. ANDREWS, Esq.

(*Lately Principal of the Mayo Technical School, Lahore; and Curator of the Punjáb Central Museum*).

The earliest pictorial representation we have of the elephant is in the sgraffito drawings executed on bone and ivory belonging to the late palæolithic period, discovered in the cave of La Madeleine in the Dordogne, and elsewhere, which, apart from the associated *disjecta membra* bear sufficient proof of their antiquity, in the subjects of the etcher's studies, which include the reindeer and the mammoth. Here, then, we have not only the earliest known representation of the elephant (of a now extinct type), but the earliest example of Art of any kind, which is at the same time an example of the ivory-worker's skill and the earliest evidence of the existence of man. But these enduring signs of man, from the distant horizon of Time's shadowy plain, tell of a civilisation which must have been developing through generations extending over many even wider intervals of time than this upon which we now look back. The skilful and unhesitating line of the draughtsman shows him to be quite familiar with his material; and the arrangement of his subject in the given space indicates something much more advanced than the ignorant groping of an unenlightened barbarian. Laugerie-Basse has yielded, in similar style of execution, an outline of a woman, and one of a man about to strike a dart into an urus; and more advanced than these, a portion of an ivory statuette of a woman.

Archæological research has given us but few definite or approximately datable connecting links in man's artistic development between these eloquent scratchings of a remote past and the historical period, becoming year by year more clearly illumined by highly scientific and practical research, of the early Egyptian Dynasties. Ascribed to the period of the 1st Dynasty, *circa* 4400 B.C., we have a considerable number of most interesting ivories, exhibiting great skill in execution and refinement in design. Among these is a figure of a king carved in the round, from Abydos, the reputed birthplace of Menes, first king of Egypt; dish-covers in the form of a cow; fragments (either carved or engraved) of fancy boxes, of which the beautifully carved leg of a bull seems to have been a favourite form of foot or support; and so on. From this early period down to Roman times we have examples of ivory work, showing how extensively the material was used in Egypt for the adornment of the houses of the well-to-do. Ladies' dressing-cases were veneered with plaques of ivory, frequently engraved and painted; their hand mirrors had handles of ivory; stibium holders, spatulas, combs, hairpins, and similar articles were of the same material. The hairpins were simply broadened at the end, or carved into figures of animals. The earlier combs were rather coarsely cut and have been described as "merely a kind of notched scraper"; but in later times a natural development took place and the teeth became finer, long and well-cut, and the backs were carved with open-work devices. It is possible that some of the "notched scrapers" were weaving combs, and would necessarily be of coarser make. All the true Egyptian combs were single, but in Roman and Coptic times they were made double, one side having coarse teeth and the other fine. The Egyptians sometimes affected ivory ear-studs, worn on the outer edge of the ear. The use of colour and heavy gilding on their ivories was frequent, as was also a method of inlaying with coloured stones, presenting an appearance very like enamelling. The ivories so treated were cut into cells, in the same manner as metal for enamelling, and into the cavities the coloured stones were carefully fitted, leaving all outlines in ivory, the whole being then polished. In statuary ivory was used to represent the white of the eye. Musical instruments were enriched with ivory, and sometimes made entirely of this material; for example, the long curved castanets, the clapping extremities being frequently carved in the likeness of open hands; and dice, known to the Egyptians from a very early date (King Rhampsinitus descended alive to Hades and tried his skill, with some success, in a game with Ceres), were of ivory also.

The examples of Phœnician ivory work discovered at Nimroud, dating *circa* 850-700 B.C., show strong Egyptian influence, but also prove the Phœnicians to have been very skilful in this branch of art. In the early days of Layard's excavations he found an ivory "figure of a king carrying in one hand the Egyptian *crux ansata* or emblem of Life, part of a crouching sphinx and an elegant ornamental border of flowers." Describing two small ivory tablets discovered in the ruins of the N.W. Palace, he says that between the two sitting figures "holding in one hand the Egyptian sceptre, ... is a cartouche containing a name in hieroglyphics and surmounted by a feather or plume, such as is found in monuments of the 18th and subsequent Dynasties of Egypt. The robes of the figures, the chairs on which they are seated, the hieroglyphics in the cartouche and the feather above it, were enamelled with a blue substance let into the ivory. . . . . The forms and style of art have a purely Egyptian

character, although there are certain peculiarities in the execution and mode of treatment that would seem to mark the work of a foreign, perhaps an Assyrian, artist."

We are told of the magnificence of the ivory throne of Solomon, and we know that his Tarshish navy, after every three years' cruise, brought back amongst its valuable cargo quantities of ivory.

The Greeks were very great ivory workers, and practised the art perhaps even more extensively than did the Egyptians and Assyrians. The chrys-elephantine statues of Zeus at Olympia and Athene Parthenos in the Akropolis of Athens were perhaps technically the most astounding art productions of these gifted people. The Zeus, a seated figure, was nearly 40 feet high. The face, chest, all the naked upper part of the body, and the feet were of ivory; "the eyes of brilliant stones. The waving hair and beard were of solid gold, as was also the figure of Nike which the god held in his extended right hand." The treatment of the Athene was similar. These masterpieces of Phideas have now entirely disappeared, but from the descriptions of Pausanias and other travellers, assisted by extant statuettes which are believed to be replicas of the great originals, we are enabled to realize their splendour and excellence. Ivory statuettes were frequently made, and the fragments of domestic furniture and implements, and personal ornaments amply attest the truth of the ancient historians' assertions of the widespread use to which the material was put. Musical instruments constructed more or less of ivory were the *aulos* (a kind of clarinet) introduced by Athene, who, however, discarded it when she beheld the reflection of her puffed-out cheeks while playing upon it; the *kithara*, Apollo's instrument, the sounding-box of which sometimes consisted of thin plates of ivory, often very beautifully carved; and with the lyre an ivory plectrum was generally used.

Chairs, stools, couches, and dress-boxes were frequently inlaid with ivory; dressing cases, combs, hairpins and innumerable odds and ends of the toilet were of the same material, as was also the stylos, which was pointed at one end for scratching on the waxed writing tablets, and broadened out at the other, like a burnisher, for erasing marks and smoothing the surface of the wax.

It has been often suggested that in order to obtain larger plates of ivory than could have been cut from the heaviest known tusks, the ancients had some method of softening the material and flattening curved sheets which were stripped off the tusk by an encircling cut of the knife; and recipes for this treatment are mentioned in the twelfth century, but they are not satisfactory, and the largest plaques known do not bear evidence of having been treated in this or any similar manner.

The use of ivory extended westward from a very early period. The Romans used quantities of it, and some very interesting pieces are in existence. One of the earliest and most remarkable is a leaf of a diptych in the South Kensington Museum, supposed to be of the second century A.D., representing a female, attended by a child, making an offering at an altar on which a small flame burns. The design and execution are most refined and beautiful. The British Museum also possesses some early examples, among which is a fine panel representing the Apotheosis of the Consul Romulus, son of Maxentius, who died 308 A.D.

But it is to the irresistible advance of Christianity, which carried with it so many of the Arts, that the great increase in the ivory-workers' craft in England and Western Europe is chiefly attributable. The symbolic art of the Byzantines, from the fourth century onwards, found expression in the ivory caskets, diptyches, retables, pyxes, croziers and other ecclesiastical objects, of which a few fine specimens are in our museums; and in the earlier examples of ivory carving found in various States of Western Europe the Byzantine feeling is very pronounced. It is not within the scope of this paper to trace the development of style in Christian Art; it will be sufficient here to state that the ivories which have survived exhibit the same chain of development as do the illuminated manuscripts, metal-work, and architecture of the various periods. Where elephant ivory was unobtainable in sufficient quantity, other ivory was substituted. Thus we have an exquisitely carved head of a tau cross in morse ivory, dating back to the early part of the eleventh century, of English workmanship, discovered in a rectory garden at Alcester, Warwickshire, and now in the British Museum. The style of ornament is strongly Celtic, and has the characteristic interlacing spiral-like scrolls of that style, combined with the refining influence of the Early English Gothic. A morse ivory seal of the twelfth century, belonging to the Benedictine Mitred Abbey of St. Albans, Herts, is also in the British Museum. Combs of the eleventh century, resembling those of the East, have been found in Wales, and on the banks of the Thames at London; knife handles, crozier heads, flabellum handles, and many miscellaneous fragments have also been found in various parts of England and Western Europe.

The Church having exhibited to the people the possibilities of Art in its many applications to ecclesiastical furniture and gewgaws, they were quick to turn them to account in domestic decoration. So we have the exquisitely carved mirror-cases, caskets, marriage coffers, goblets, and an endless variety of frivolous objects, ornamented with scenes from various romances, mythological and quasi-historical tales, more or less decorous, in

accordance with the humour of the age, and occasionally in combination with Biblical subjects.

Borne by the return wave of Christianity from the West to the East, the Portuguese Franciscans were thrown upon the western shores of India at Goa, carrying with them the pomps and vanities of their church; and among the relics of those days, there exist a few curious sixteenth century local ivory carvings in which is clearly manifest the hand of the Indian craftsman guided by his Franciscan teachers, endeavouring to portray, after Western convention, symbolical subjects for the use of the Fathers. A very fine Jesse-tree panel, now in the Mediæval Antiquities department of the British Museum, is a most interesting example of this combination. The idea was not a new one to the Indian, for he was accustomed to represent Brahma seated on the lotus growing from the navel of Vishnu; so he could, and did, throw a good deal of his own feeling into the work. The tree is charmingly conventionalised, the Jesse figure is a fine Eastern type (suggesting Sassanian), and the Madonna and Child seated on the lotus at the top, surrounded by a gilded vesica, have a distinctly Indian character.

The Good Shepherd (Plate 88) is quaint, but is doubtful Indian, although from Goa. The figure is apparently Portuguese, and there are only a few details which may have been cut by an Indian. An interesting ivory, on the same plate, represents Vishnu standing before an arch or *krittistambha* surmounting the world, which rests upon its supporters—the coiled Nága with hooded heads overshadowing the god, the Lotus, Elephants and Nágas, and the Tortoise; the whole being enthroned on a *simhasana* or lion throne. Eight lotus petals are placed round the coils of the Nága on which are small figures, perhaps representing the *Ashtadikpalakas* (regents of the eight points of the compass).

Another piece of about the same period is the quaint scene in the Garden of Eden represented on two panels forming the doors of a casket (British Museum). The work is rough and has but small artistic merit, and were it not for the comparative accuracy of the elephant in the design, and the fact that the example comes from Goa, no Indian influence need have been suspected. Two replicas from the same original are on a casket in the India Museum.

Whatever may have been the use of ivory in India, Ceylon and adjoining States, where the elephant is indigenous, we have very few existing evidences of that varied application of it beyond the Court, such as obtained in the nearer East, Greece and Rome. This is doubtless due partly to the destructive influences of political disturbance and the consequent conditions of living, which were not such as encourage elaboration of domestic appointments and the general advance of æsthetic culture. The artist's skill seems to have been applied chiefly to the decoration of arms, of trappings and furniture for pageants, and to the embellishment of royal palaces, temples and tombs; and within these limitations the use of ivory was probably lavish. The earliest examples we possess are a few double combs beautifully carved and pierced, and one or two bas-relief panels and fragments depicting Hindu sacred subjects. A fragment of a small figure in the round, in the style of the Gandhára sculptures; two dice, one cuboid and the other prismatic; an astragal, stained red; a seal, and a few other pieces, were recently discovered by Dr. Stein during his archæological excavations in Chinese Turkestan.[1] Some interesting fragments from the site of the ancient city of Brahminabád in Scinde, destroyed in the eleventh century, have representations of the *yáli* and elephant. Of more recent date is a fine casket, covered with plaques of carved and pierced ivory, from Southern India, reproduced on Plate 89. The general form is one that is universal, and of considerable antiquity; the mouldings and decorative details are generally good Hindu admirably adapted; the dancing figures occupying the broad central panels of the sides are grotesque and rather late, but are well balanced as decoration; the upper band of sacred geese is very successful. The nature of the work renders it very liable to damage, and this piece seems to have met with rough usage. A casket of similar shape, but not nearly so fine and rich in design and execution, is the seventeenth century example from Travancore, reproduced on Plate 87 in the July number of the *Journal of Indian Art*. In this the lower members are enriched with lotus leaves and seeds. The division of the panels by horizontal bands spoils the design, and the *simhas* in the lower sections are too large and compete with the dancing figures above. The large panels of the lid are well balanced, but rather inferior in drawing and execution. Combs of the double pattern familiar to the early Greeks and Romans, are made in India at the present day, and some very fine examples are to be seen in the India and British Museums, many of them decorated with colour and gold.

The beautiful design and workmanship of the sacrificial ladle shown on Plate 86 in the July number of this Journal is typical of the ivory work of Ceylon. There is a distinct method of conventional elaboration in the scrollwork, very striking and quite unmistakable. The general form of the scrolls may be likened to the upward flow of smoke and flame; and as thin threads of smoke rising beside heavy ones are curled over as they meet the downward roll of the greater, so we see in this ornament innumerable lines flowing along the general direction,

[1] Stein, *Preliminary Report, Archæological Exploration in Chinese Turkestan.*

but terminating in tiny volutes under the shadow of larger ones. Sometimes two masses will divide and join higher up, and in the hollows so formed, sparks like pearls may be seen to rise. And with all the scrolls and sparks and ripples the balance of the gently waving mass that issues from the jaws of the grinning fire-breathing *yáli* in this example is perfect. The only unsatisfactory part is the fat little figure at the base of the handle. A few fragments of very fine and early Cingalese work are in a table-case in the Buddhist gallery of the British Museum.

The *sarinda* reproduced on Plate 89 is made entirely of ivory and is a very beautiful piece of work. The head is carved into the form of a *makara*, devouring elephants; the sides of the key-box are panelled and filled with a graceful chrysanthemum design, the peg holes forming the centres of four of the flowers. On the top of the box and kneeling at the shoulders of the *makara*, are little figures bearing chaplets and *chauries* (fly-whisks). The neck of the instrument is perfectly plain, but below, on the gracefully swelling shoulders, are panels containing celestial figures, crowned and armed with sword and buckler; very chaste borders emphasize the undulating form of the body, and the upper part of the waist is powdered with four-petalled flowers. This class of instrument, chiefly used by women to accompany dancing and light songs, was invented by Rávana, the Rakshasa lord of Lanka,[1] and although it has been described as very harsh and disagreeable in sound, it is also said to be peculiarly adapted to the female voice! Well, the demon who invented it died a violent death, some long time ago.

Ivory carving and tarsia work is practised now nearly all over India, from Amritsar to Ceylon, camel bone often supplying the place of elephant tusk. The lace-like fretwork combs, fans, card-cases, &c., of Amritsar are well known, as are also the miniature animals, figures and delicately carved state barges of Delhi and Berhampur. A fine example of modern work is the mythological piece reproduced on Plate 91, executed with great skill at Berhampur. This is reproduced for the sake of its technical qualities rather than for its purity of design, which is a bizarre mingling of Georgian and Indian styles, and was made for the Exhibition of 1851. The story represented is the victory of Dúrgah (Parbati) over Máhishásúra, king of the Asúrs (gigantic demons), who, appearing in the form of a buffalo, is discovered when the animal's head is struck off. The lion *váháná* of the goddess seizes the demon's right arm, while a cobra held by the tail encircles his body, and Dúrgah herself seems about to complete the victory. But, hopeless as his position would appear, his complete overthrow was eventually only accomplished by the beautiful goddess with the more potent weapons of her personal charms. Our friend Ganeça appears to the right (proper) seated on his *váháná* (the rat) and supported on a lotus.

Some pieces of furniture made in Berhampur by craftsmen capable of the most skilful execution are now in the India Museum at South Kensington, and although perhaps of historical interest, they furnish eloquent testimony of the evil of introducing to the Oriental craftsman European notions of design, which, even if good, he cannot assimilate, and can only reproduce undigested and in purely speculative combination. These ebony and ivory productions, upholstered in European brocade, have some fine work upon them, and were doubtless very costly, but they are of the most debased style of European art of the last century aggravated by the addition of excrescent elephants' heads, snakes, winged Graces and other embellishments.

The ivory inlay of Bombay is trivial and meaningless, and that of Vizagapatam almost as bad. The Hoshiarpur inlay, which is often of camel bone on shisham wood, has deteriorated in responding to popular demand. Breadth of design and careful workmanship, which occasionally characterised the best of this work, have given place to an "all over" treatment composed of small snips of badly shaped ivory set in cavities which they only approximately fit, the difference being filled up with sawdust and glue. Yet the craftsmen *can* do really good and artistic work if properly guided and rigidly kept from the almost incredibly inartistic advice so freely given them.

The state barge (Plate 90), a favourite subject with the Delhi ivory workers, shows skill and is graceful, but has not a true Indian ring. It was made at Berhampur, and so has come under European influence. There is in the India Museum a snuff-box made of transverse sections cut from the great molar teeth of the elephant, the foldings of the dentine and other component tissues presenting quite an agreeable pearly effect. Another product which may be mentioned here is the so-called elephant pearl (*gaj-manik*), a solid substance occasionally found in the head of the elephant and greatly valued as a charm. An inscription dated Samvat 770, on a column on the banks of the lake near the city of Chitor, says: ". . . From him was descended Rájá Bhoj . . . who in the field of battle divided with his sword the elephant's head, the pearl from whose brain now adorns his breast."[2] From the hairs of the tail women make rings, bracelets and other ornaments. An exudation which proceeds from the elephant's temples (called *mada* or *dana*) at some seasons, is frequently alluded to in Hindu poetry as sweeter than

[1] Mukharji, *Art Manufactures of India.*

[2] Tod, *Rájásthan*, Vol. I.

the scent of flowers, and is said to deceive the bees![1] The *Ain-i-Akbari*, however, calls it a "most offensive smell."[2]

Of the representation of the elephant himself in Ancient Art, there appear to be very few examples west of India. The obvious explanation of this seems to be that he was not a familiar figure in those lands of the West and near East where the fine arts flourished. A few examples have, however, been discovered. He was sculptured in various places along the Nile; and in a procession of foreign nations bringing tribute to King Thothmes III., *circa* 1544 B.C., a young elephant (probably Indian) is being led by men of the "White Race." Upon a small obelisk discovered among the ruins of Nineveh, a king is represented receiving prisoners "and tributaries carrying vases, shawls, bundles of rare wood, elephants' tusks, and other objects of tribute, and leading various animals, amongst which were the elephants," &c. "From the animals portrayed, particularly the double-humped camel and the elephant, which is of the Indian and not of the African species, it is natural to conjecture that the obelisk was sculptured to commemorate the conquest of nations far to the east of Assyria, on the confines of the Indian peninsula."[3] Among domestic objects from Egypt we have a toy elephant and rider, with movable limbs (missing), made of porcelain and dating from the Roman period. The rider seems to be an Egyptian. A small ivory elephant charm probably belongs to about the same period.

The elephant appears to have been more familiar to the Greeks, probably from their having been at times brought into contact with him on the battle-field; and it is said that Alexander assumed the elephant head-dress on some of his later medals in honour of his victory over the great elephant army of Porus.

The Romans had a proper appreciation for the imposing presence of the elephant in triumphal processions, and as long as the power of the Empire retained its supremacy he appears as a picturesque figure among them. In the accompanying ivory leaf of a diptych (Plate 88) the Consul Romulus is represented seated in a triumphal car drawn by four elephants abreast, and although the execution is not of a high order, the artist seems to have had a certain personal knowledge of the form of the animal. On a curious Roman intaglio the fore-part of an elephant, with *mahaut* astride his neck, issues from a kind of nautilus shell; and there are other instances of the use of the elephant by the Romans on coins and seals. It is stated by Polyneus that Cæsar brought an elephant to Britain in the year 54 B.C. which greatly terrified the people.

Coming to a later period we find in a set of ivory draughtsmen of the thirteenth century, of European (probably German) make, the representation *in relievo* of a bullet-headed elephant carrying a high two-storied howdah in which are seated four persons. From about this time the form of the elephant seems to have become a matter of doubt and speculation and was largely dependent upon the ingenuity and inventive capacity of the artist; certainly the ignorance of the artists of Europe from the fifteenth century onwards as to the true form of the animal seems to have been profound, and many of the versions we have of him are decidedly humorous. It would appear as though they received their inspirations from representations on pottery and other works of art from China and Persia. It is noticeable that the further east of India one gets on the Asiatic continent, the less true to nature the elephant is drawn; the Chinese artists drawing it with a round bullet head, ill-fitting tusks, a trunk like a length of fire-hose, and no joints to its legs, which are clothed in a cutaneous covering many sizes too large, setting in horizontal wrinkles all the way up. These peculiarities were copied in Persian art, which added one or two more new points; and doubtless during the extensive European trade with Persia and China in the fifteenth, sixteenth and seventeenth centuries, these types were copied or drawn from memory whenever an elephant had to figure in books of travel or in decorative design; and where the artist's memory was at fault his imagination furnished the void with new creations.

From bas-relief on an ivory horn. Europe, 1599. Brit. Mus.

That the Persians themselves were not successful in raising elephants is testified by a native poet, who "speaking of an elephant that was born in the stables of Khosru Parviz observes that 'never till then had a she-elephant borne young in Irán, any more than a lioness in Rum, a tabby cat in China or a mare in India.'"[4]

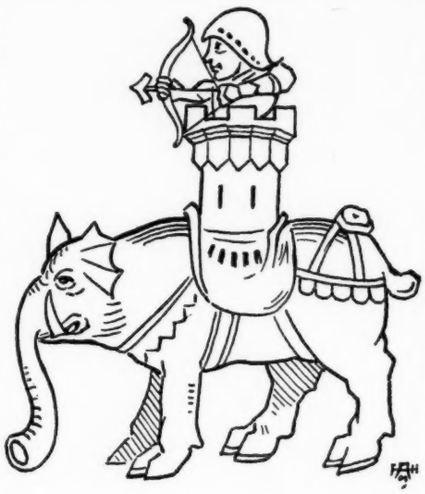
[1] Balfour.

[2] Watt. *Dic. of Econ. Products.*

[3] Layard's *Nineveh.*

[4] Marco Polo, Vol. II. p. 350, note 13.

The accompanying sketch, copied from a German "Johannes von Monteville Ritter" printed by Johann Prüss at Strassbourg in 1484, would for quaintness in the conception of the elephant be difficult to beat. In the early part of the sixteenth century curious representations occur on the majolica of Italy, one of the strangest being on a Caffaggiolo piece, where he is represented with enormous ears and long claws taking part in a triumphal progress of the Indian Bacchus. On an interesting piece of Lambeth Delft ware, depicting our first Parents in the Garden, among their domestic pets, are two humorous hairy elephants with very large ears, but having the appearance in other respects of supernaturally long-legged hedgehogs.



The *ébenists* and *ciceleurs* of the time of Louis XIV. to Louis XVI., in their craze for new elements for their increasingly extravagant designs, could not resist using the elephant, and we find costly horologes borne upon the backs of unnatural hairy-tailed specimens; whilst the potters of Sèvres also gave way to the temptation, using elephants' heads with curled trunks for handles of vases—an application pardonable as a relief from infinitely worse incongruities.

Examples of the Persian conception of the elephant may be seen in their engravings on ivory, enrichments of arms and powder horns, metal repoussé, engraved work and enamels; and a particularly glaring example on an earthenware plate of the seventeenth century, in which is an elephant composed of grotesque animals. The tusks proceed from the lower jaw upwards, and he appears to be trampling on a man, while two female figures standing on a nebulous island near by, lift up their hands in well justified horror and amazement.

On the ancient coins and seals discovered from time to time in the provinces on the N.W. Frontier of India, frequent use is made of the elephant as an appropriate emblem by foreign Chiefs and Rulers, from Alexander the Great (with his elephant head-dress) onward. With the "Oxus treasure" is a stone seal bearing an elephant-headed fish; and in the Pearce collection of antique gems (now in the India Museum, South Kensington), are Græco-Bactrian, Indo-Scythian, Indo-Sassanian and Romano-Indian seals bearing elephants, either mounted or bare-backed; and one inscribed in Roman characters EUSEBIUS, bearing an elephant and a monkey—a combination we shall meet with again. Among coins of the Græco-Bactrians, Demetrius and Lysias are represented with the elephant head-dress; on the reverse of a coin of Antialkidas is an elephant's head, holding in the upraised trunk a wreath which it appears to present to Jupiter Olympus. On a coin of Apollodotus an elephant appears on one side and an Indian bull on the other; and Menander and Zoilus both made use of an elephant device. Several of the Indo-Scythian kings used the elephant on their coins, and on some of those of Huvishka the king is riding astride the elephant. The Parthian king Mithridates III. makes use of an elephant head. Some of the most interesting are the rude Buddhist coins bearing elephants, chaityas, human figures, serpents, trees and other emblems such as are found on the earlier Buddhist architectural sculptures. It is an interesting fact that, although these coins are extremely rough and rude, the elephant has frequently more "go" and feeling about it than one usually finds in him as depicted by the more skilful Græco-Bactrian and Indo-Scythian medallists.

But it is in architectural sculpture and mural decoration in India that the elephant is seen at his best. Nowhere in the world has he been drawn and chiselled with such fidelity and expressiveness. He romps and runs, wrestles and hunts, plays and prays; is a jolly companion amongst men and monkeys; is propriety itself when assisting in tableaux with the gods; and is altogether a big, good-tempered and useful member of the community and a true elephant all the time. His introduction into architecture seems to be attributable to that section of the early inhabitants of India, called by Fergusson the Dasyus, who were the earliest possessors of the country of which we have any knowledge, and who seem to have occupied the whole of the central and northern part at the time of the first Aryan influx from the north-west. Fergusson's theory is that these were the people who became Buddhists, and that they were at the time worshippers of trees and serpents, a form of religion that (judging from the early sculptures) seems to have, for a time, overlapped, and ultimately to have become absorbed into Buddhism. On the magnificent sculptured gates of Sánchi, where Buddhist relics were enshrined, tree worship is represented; and on the sculptures of Gandhára we frequently find Buddha himself visiting the Nága (serpent) king and queen. Each successive Buddha found enlightenment under a sacred tree, and the last incarnation (Gautama Buddha) honoured the Banyan (*Ficus indica*) for this purpose; and it was here that Mára's gigantic elephant, standing two hundred and fifty leagues high and named "Mountain girded," when urged by his evil master to destroy the Holy One, fell down on his knees in reverence before him.

The earliest sculptured elephants yet discovered in India are those round the entrance to the cave of Lomas Rishi in Behar, probably as early as the time of king Aśoka, *circa* 250 B.C. The style of the architectural features on this cave are in every detail copied from wooden construction, and there is every evidence that the sculptors of India had reached a very high level of excellence in wood carving long before they made architectural use of stone. Of about the same period is the *lát* or pillar at Sankissa, near Muttra, having a cap in the Persepolitan style surmounted by a kind of inversely stepped square abacus, closely resembling the Tee feature of the early Dagobas, supporting a group of elephants and horses with male and female riders.

Among the most interesting of the earliest surviving *relievos* are the four panels reproduced in Plate 93, showing elephants associated with monkeys. The extreme freedom of the design and the humour of the subjects depicted evince a disregard of technical difficulties that argues a considerable and flourishing period of the sculptor's art. The elephant, unable to resist the invitation to share in a prank, is being instructed by the quick-witted monkeys (fig. 1). The unhappy victim of this mighty surgery seems to be a person of some consequence, if we may judge from the fact of his scanty clothing consisting entirely of jewellery. He is plump and thereby confesses his partiality for the good things of the table; whence, we may venture to deduce, the dental trouble, for it is an upper molar that claims attention. How completely and eloquently the incident is told! The patient, who seems to have been reduced by his sufferings to a nervous, limp and almost tearful condition, holds the stool with his right hand, while the elephant expresses by trunk and feet that he is beginning to pull, goaded by the monkey astride his neck who is energetically applying the *ankus*, as another belabours him with a cudgel and bites his tail to make him jerk forward. One can see how the forceps will tighten their grip as the tension on the rope increases. To further excite the elephant and to distract the attention of the patient from his pain, one monkey beats a drum and another blows the conch, while a third is performing some operation with a lancet (?) to the patient's left hand, perhaps as a counter-irritant. The conception is complete; the manner of expressing it inimitable.

The same wonderful completeness characterises the scene in fig. 2 on the same plate. The monkeys having captured a tusker, are bringing him home in triumph. By the simple device of binding a billet of wood to the inner side of his trunk, that mobile and deadly weapon is rendered harmless; and by further attaching trunk to tail by a rope passing below the body, the head is constrained to safe movements. The wide-open eye and nervous gait admirably express the poor animal's agitation of mind.

Figure 3 depicts a somewhat similar scene, but here five of the monkeys are making a vehicle of their capture, and this overcrowding is leading to bickerings. The monkey who has jumped up last and has grabbed the tail of another as a scaling rope, is receiving a vigorous protest from the owner; and a discussion that has arisen between the coachman and the conductor, apparently on the subject of driving and the use of the goad, is evidently becoming heated, and threatens to extend to other members of the party. The fourth panel is altogether weaker and obviously by a different hand. These four examples are from fragments of the Buddhist Rail at Bharhut.

The most elaborate rail yet discovered (that of the Sánchi Tope) is particularly interesting in connection with our present subject from the number of elephants appearing on the four great Toráns or gateways disposed at equal intervals round its circumference; and in Plate 94 is given the upper part of the inner aspect of the Northern gateway, erected about the first century of our era. The two capitals supporting the system of architraves are fine examples of the architectural application of the elephant, and show how thoroughly these early sculptors knew their subject. The trunk is massive, powerful and mobile; the front of the head is broad and high; the upper lips round over the tusks (missing); the orbital arch is pronounced; the feet feel the ground firmly yet easily, and the whole appearance is that of great strength and ample capacity for supporting the superimposed burden. The group of elephants surmounting the centre of the topmost architrave between the two *trisulas*, supporting the Wheel of the Law, are equally fine, and with easy step seem to be circling round. On the face of this architrave elephants are shown gathering lotuses and bringing them as offerings to the Sacred Tree in the centre. In the left-hand panel, between the lower and middle architraves, two elephants supported on lotuses pour the sacred liquid from *gamlas* over the seated goddess Sri. This is a tableau constantly appearing, and illustrates the description quoted by Fergusson from Wilson's *Vishnu Puráná*:—"Then seated on a full-blown lotus and holding a water-lily in her hand, the goddess Sri, radiant with beauty, rose from the waves; Ganga and other holy streams attended for her ablutions, and the elephants of the skies, taking up these pure waters in vases of gold, poured them over the goddess, the Queen of the Universal World. Thus bathed, attired and adorned, the goddess, in the view of the celestials, cast herself on the breast of Hari." On one of the other gates is a much finer representation of elephants attending upon a sacred shrine, and in this connection, as noted by Fergusson and Sir Lepel Griffin, it is interesting to find from the account of the Chinese pilgrim Hiuen

Tsiang, in the seventh century, that such scenes may have actually occurred. Alluding to a *sanghárâma* near to the *stupa* at Rámagráma, he says:—"Formerly there were some Bhikshus who agreed to come together from a distance and to travel to worship this *stupa*. They saw when they had arrived a herd of elephants, coming and departing together. Some of them brought on their tusks shrubs (*leaves and branches*), others with their trunks sprinkled water, some of them brought different flowers, and all offered worship (*as they stood*) to the *stupa*. When the Bhikshus saw this they were moved with joy and deeply affected. Then one of them giving up his full orders (*ordination*) vowed to remain here and offer his services continually (*to the stupa*), and expressing his thoughts to the others, he said: 'I, indeed, considering these remarkable signs of abounding merit, count as nothing my own excessive labours during many years amongst the priests. This *stupa* having some relics of Buddha, by the mysterious power of its sacred character draws together the herd of elephants who water the earth round the bequeathed body (*of the saint*). It would be pleasant to finish the rest of my years in this place, and to obtain with the elephants the end (*at which they aim*).'"[1] Whatever foundation of fact there may be to this story (and when it is remembered how much elephants may be trained to do even in these degenerate days, there seems some measure of probability in it) it is indicative of the high estimation in which these early Indians held the elephant. On fragments from the Buddhist Rail at Amravati there are a few instances of very clever foreshortening of the elephant in bas-relief. In the India Museum are two plaques of carved stone said to have belonged to the small *tope* at Sánchi, on one of which is apparently an elephant with a fish body, and on the other a *makara* swallowing fish.

The Cave-Temples have frequent elephant carvings. Hiuen-Tsiang mentions two at the entrance to one of the caves at Ajanta, and these are said to be still traceable (if they are the same) in the front of Cave XV.[2] The well-known fresco paintings in these caves contain crowds of elephants in every possible position and extraordinarily lifelike. At the great Chaitya Cave at Karli, dating from *circa* 150 B.C., are three sculptured elephants on each return wall at either side of the entrance, about life size, in high relief, and facing directly outwards from the wall. Above these is a kind of sculptured architrave divided into three compartments, each compartment having a seated Bodhisattwa and two attendants; each group comes centrally over the elephant below it, and so gives the appearance of being borne on his back, yet without breaking the continuity of the architrave. It is in this cave, Fergusson says, that we first find the architectural arrangement of the elephant as a "string course" or *gajapitha*, associated with other animal courses in a certain order of sequence so generally used in later buildings. Fa-Hian in the beginning of the fourth century, describing a convent in Dakhan, says: "This building has altogether five stages. The lowest is made with elephant figures. . . The second is made with lion shapes. . . The third is made with horse shapes. . . The fourth is made with ox shapes. . . The fifth is made with dove shapes."[3]

Fergusson, in his description of the great Chaitya Cave at Karli, says: "The nave is separated from the side aisles by fifteen columns on each side, of good design and workmanship; on the abacus which crowns the capital of each of these are two kneeling elephants and on each elephant are two seated figures, generally a male and female, with their arms over each other's shoulders. . . . The sculpture of these is very good and the effect particularly rich and pleasing."

In a rock-cut temple at Pitalkhora, occurs an elephant winged after the manner of the Assyrian sculptures, with singularly inadequate pinions.

The three fragments from the temple of Parasuramesvara at Orissa, probably as early as the sixth or seventh century (Plate 98), are very free in treatment.

At Máhávellipur, near Madras, are sculptured on the face of a granite rock a number of elephants of various sizes, who, with other beasts, birds and monsters of the earth, and with the Gandharvas and other celestial persons accompanied by their consorts, are proceeding to pay reverence to the Nága Court just visible to the left of the picture (Plate 95). Unfortunately, the Nága king has lost his head (unless it has been replaced since this picture was taken). These sculptures, which Fergusson thinks may be as late as the eighth century, but which certainly look earlier, are altogether wonderful in their grace and correct proportion; and the rendering of the bone and muscle in the elephants' heads is particularly worthy of notice.

In the Dasa Avatara Cave at Ellora there is a fine Ganapati on the staircase, and in the upper chamber a figure of Bhairava holding the hide of the elephant Gajasura slain by him; in the ante-chamber is another huge Ganapati (belly-God = Ganeça).[4]

The rock-cut temple at Káilasa dates from about the eighth century and contains some magnificent elephant sculptures. The temple is supported by a base composed of these creatures, described as "in every possible

[1] Beal, *Si-yu-ki*, Vol. II.
[2] Beal, *Si-yu-ki*, Vol. II., and Fergusson and Burgess, *Cave Temples*.
[3] Beal, *Si-yu-ki*, Vol. I. p. lxix.
[4] Fergusson and Burgess, *Cave Temples of India*.

attitude—feeding, fighting and tearing each other to pieces, but all executed with considerable spirit and truth to animal forms, and, notwithstanding the freedom with which they are executed, all seeming to support the temple above."[1] At the north and south ends of the court are two full-size elephants standing free and sculptured in the round. After the period of these rock-temples such huge elephants do not seem to have been much used, for the practical reason of the labour involved in carrying the masses of stone necessary to construct them; but the built temples, with their more delicate detail, still used the elephant in the *gajapitha* and as brackets and other comparatively small features.

Among the Gandhára sculptures, the elephant necessarily appears occasionally, but he was evidently not quite well known to the Græco-Buddhist sculptors, as he is never well drawn and is apt to suffer from the stiffness usually attributed to him by those to whom he is least familiar; and in one instance, on a fragment in the British Museum, where Buddha is represented seated in the cavern (Indra-sila-grihá) listening to the harp of the divine musician Panchaśikha, the elephant (? Airavata), seated in the front of the cave, has the fore-legs doubled the wrong way. His various appearances are almost entirely in connection with the Játakas or Birth Stories. He appears as the Chhadanta, the six-tusked elephant, a previous incarnation of Bodhisattva, who himself broke off his tusks and gave them to a hunter from a feeling of profound respect for the sacred robe (*kasháya*) in which the latter had disguised himself as a religious ascetic.[2] As the rain-compelling elephant he appears in representations of the Vessantara Játaka. An interesting series of sculptures from a small *stupa*, discovered during the last Swat Valley expedition a few years ago, depict the story of the "casting away" of the elephant.[3] After the athletic sports outside the city of Kapilavástu, in which the Prince Siddhártha had vanquished all comers, the royal elephant-keeper was leading a riding elephant to meet the young Prince and bring him home; but the jealous Devadatta meeting it just as it was about to pass out of the city gate, asked insolently, "Who is going to ride on this gaily caparisoned elephant?" Having been informed, he gave way to violent passion, pulling the elephant down; and striking and kicking it, left it senseless in the road, blocking the way. Nanda approached and asked who had killed the elephant, and being told, he drew it on one side. Then the Prince arrived and having also enquired into the matter, he lifted the elephant up, and swinging it round his head, hurled it over the city wall and across the moat, where in falling it made a deep ditch, which is there to this day. In another sculpture from the same district is the story of the miraculous conception. Queen Máhámáya, who had borne her husband no children, is calmly sleeping at midnight, on her couch in one of the apartments of the palace. The Divine Buddha in the Túshita heaven, becoming aware that his time for re-incarnation is at hand, has determined on the family, the country, the time, the race, and the woman to be honoured by his birth. Having chosen Máhámáya to bear him, we see him in the form of an elephant surrounded by a halo, descending to the sleeping queen. She dreams a strange dream, and in due course the miraculous birth takes places under the cool shade of an Asoka-flower tree in the Lumbini grove. The infant Buddha is also sometimes shown being bathed by two elephants—a *motif* borrowed from the Sri or Gaja Lakshmi tableau already described. The victory of Buddha over the *mast* elephant of King Adjatasatru, which was a terror to the good people of Rajâgriha, is a very frequent subject, There are in the Lahore Museum, among the Gandhara sculptures, a few cantilevers rather similar to that shown on Plate 100. This example, however, is of terra-cotta, and is one of several deposited in the India Museum, with many other moulded fragments of the same material, of excellent and very old work.

The beautiful temple at Modhera in Northern Gujarát has a fine elephant course, and at Siddhapur are the remains of the great temple called Rudra Málá, built about the end of the twelfth century, in which, according to a still extant local ballad, "Fifty-six lákhs of horses and elephants formed a line."[4] In the ceiling of the Chalukyan temple at Ganjigatti,[5] in Dhárwár district, is the fine four-tusked elephant Airavata carved in bold relief, trotting amiably along as the vehicle of Indra and his consort. The whole pose and swing of the elephant indicate thorough enjoyment; the chaplet encircling the right frontal eminence suggests a small skull-cap set jauntily in that position, and the curl and swing of the trunk seems to be appreciative of the celestial musical bombilation maintained by the accompanying minstrels. He seems to rejoice at having life, while the vehicles of the remain-

[1] Loc. cit.

[2] This would give the profession of ivory hunting an antiquity of a few million years!

[3] Beal, *Si-yu-ki*.

[4] Burgess and Cousens, *Arch. Antiq. of N. Gujarát*.

[5] Reproduced in *Technical Art*, 1892.

ing seven Ashtadikpalas, or Regents of the Eight Points of the Compass, are mere stone conventional creatures. The Chalukyas were particularly fond of the elephant and the *makara* or *yáli* in the details of their temples, and although in later days the elephant was not given the freedom he enjoyed in earlier times, yet he was still far from being stiff and conventional. One of the most exquisite examples of the architecture of the thirteenth to fourteenth centuries is that of the Great Temple at Halébid, in Mysore, a portion of which is given in Plate 99. Here the various animal courses are well shown, and in the lowest, or *gajapitha*, we see the elephant cheerfully jogging along in a procession of something like 2,000 individuals.

It would seem as though the suppression of the elephant in architecture was synchronous with the intrusion of the *yáli*. This grotesque monster, who appears to have extreme Eastern blood in him, was petted and made much of in the south of India, and was actually allowed to feed on elephants; consequently, he has with vulgar assertiveness, taken the dominant place in the work of later times. It is annoying to see this over-groomed evil-looking beast rearing up on end as at Vellur and Madura, crushing and eating his helpless victim. But he is never an architectural success, which is some consolation, and had a revival in Indian architecture been possible, he would, by his intolerable conceit, most certainly have brought about his own extinction.

Krishna riding on an elephant improvised by the milkmaids of Gakula.
Drawn from a photograph of an Indian painting in Atkinson's *Hindu Pantheon*.

LIST OF ILLUSTRATIONS.

88. "Good Shepherd"; Vishnu; Leaf of Diptych. 89. *Sarinda*; Casket. 90. Miniature State Barge. 91. Carved Ivory Tableau. 92. Ivory Chair. 93. Bas-reliefs from Bharhut. 94. Inner Face of Gateway, Sánchi Tope. 95. Sculptured Rock, Máhávellipur. 96. West Side of Navalákhá Temple. 97. Ganeça's Rath. 98. Sculptures from Orissa. 99. Back of Shrine. 100. Moulded Terra-cotta Cantilever. 101. Bronze Worshipping Elephant. 102. Spandril. 103. Bracket. 104. Plinth. 105. Bracket. 106. Two Ganeças. 107. Elephant with Howdah. 108. Elephants as Executioners.

88.—Ivory "Good Shepherd." Goanese.
(*British Museum.*)

Vishnu representing the Universe.
(*British Museum.*)

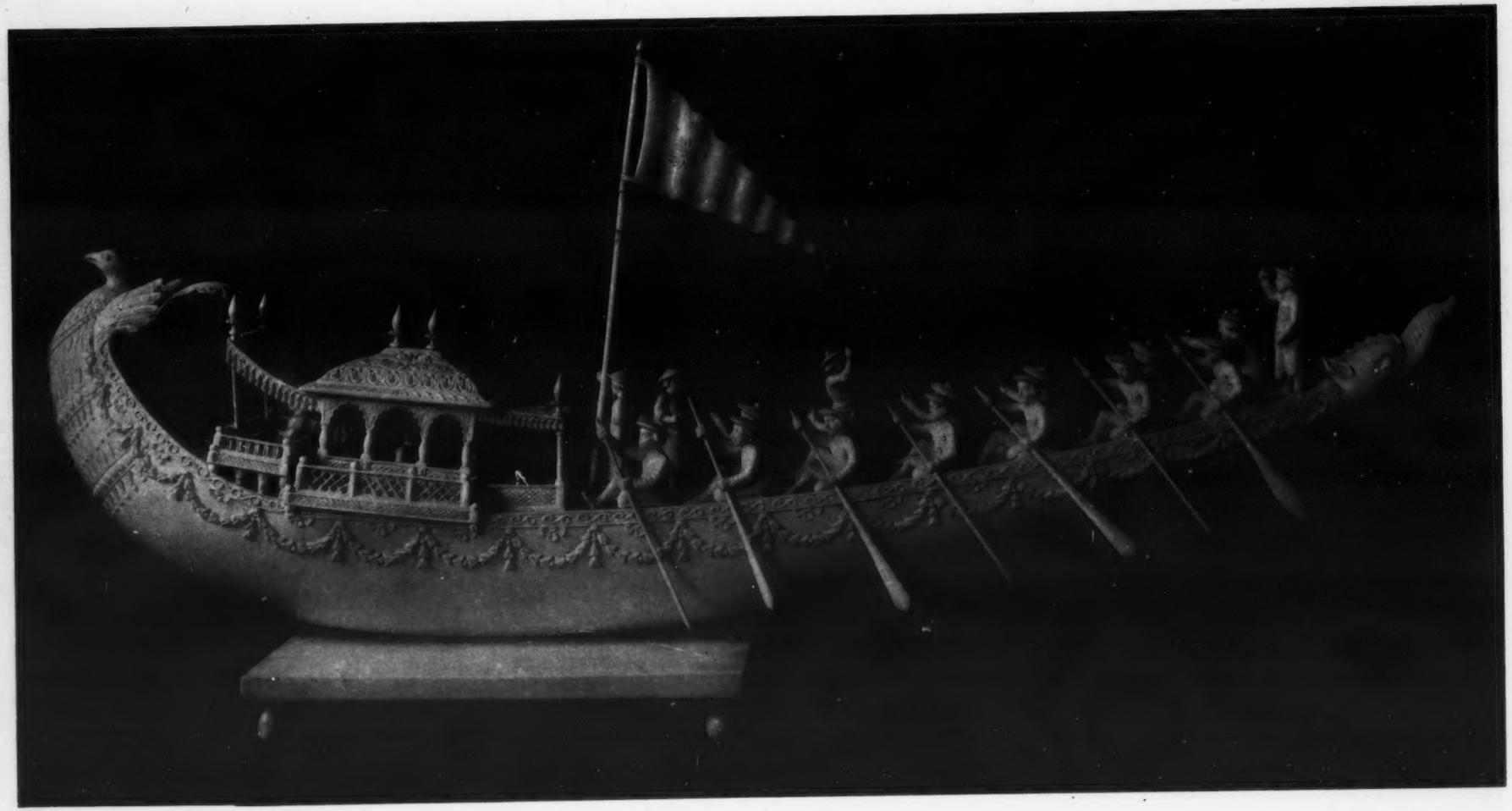
Leaf of Ivory Diptych. Roman (about Fourth Century).
(*British Museum.*)

Ivory Sarinda. British Museum.

About half size.

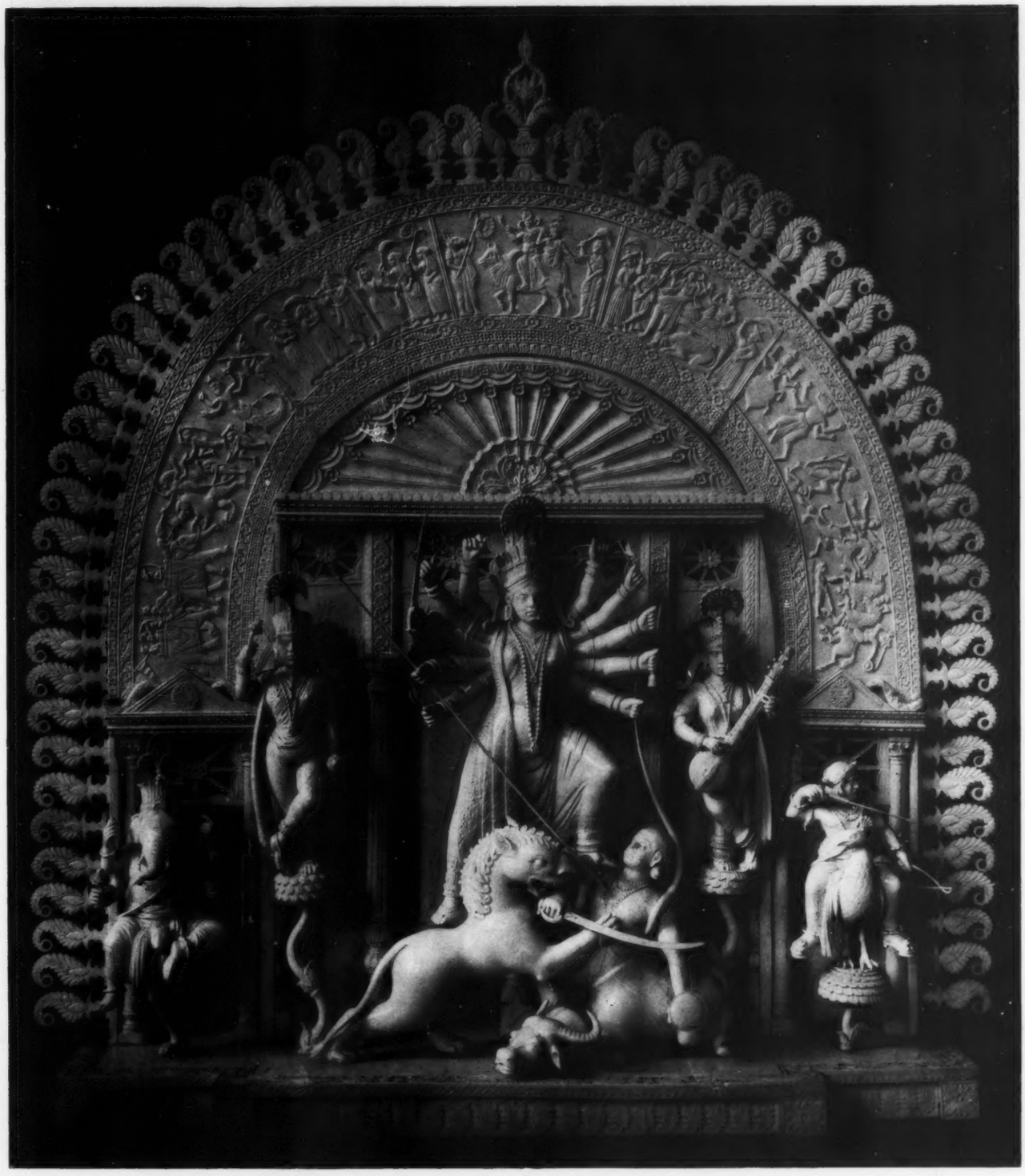
89.—Ivory Veneered Casket. British Museum.

Scale, about one-third.



90.—Miniature State Barge in Carved Ivory, made at Berhampur.

(India Museum, South Kensington.) *Scale slightly reduced.*



91.—Carved Ivory Tableau, representing Durga triumphing over Mahishasura.
Made at Berhampur, 1851.

(India Museum, South Kensington.) *Scale rather less than half size.*

92.—Ivory and Ebony Chair made at Berhampur.

(India Museum, South Kensington.)

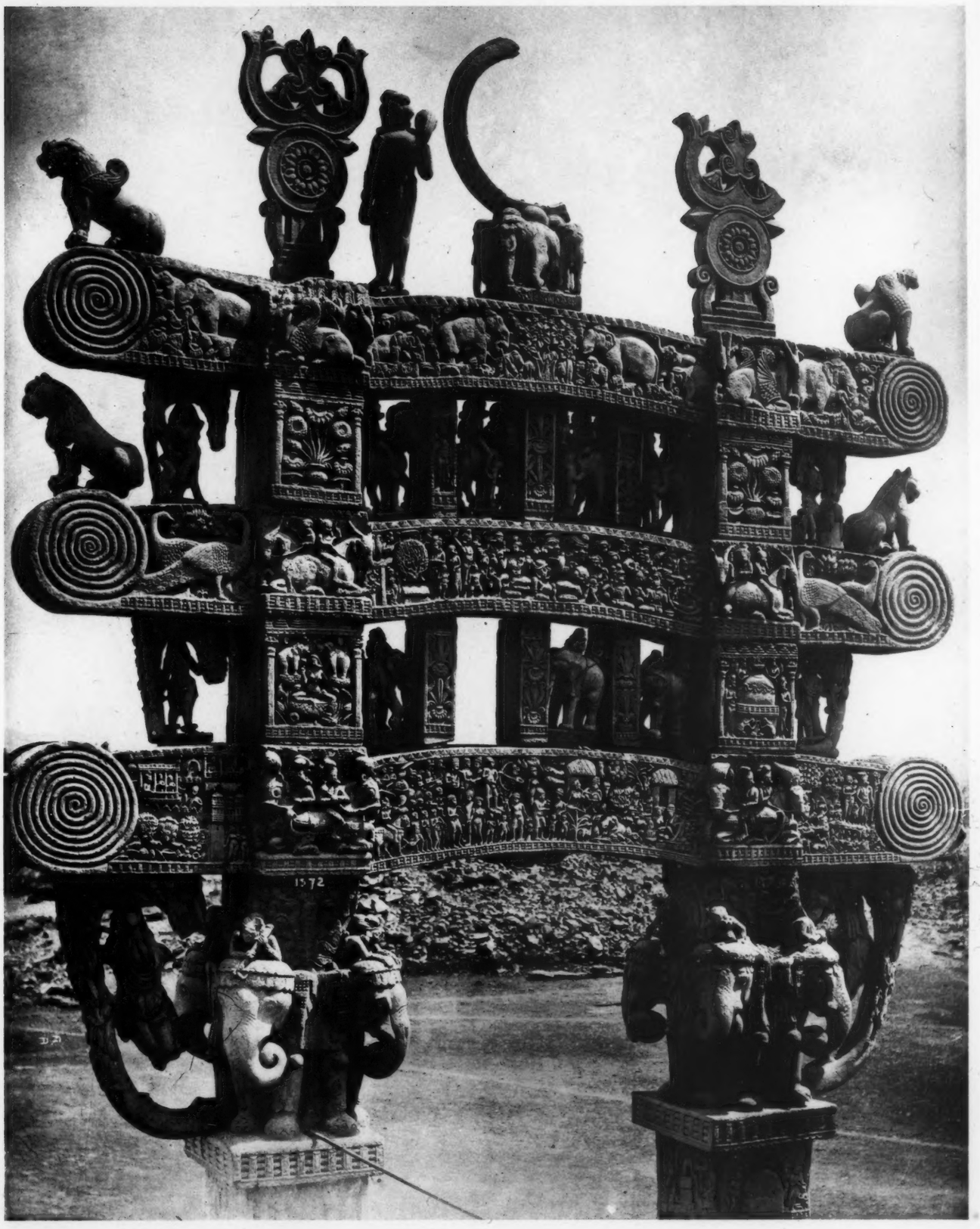
1.

2.

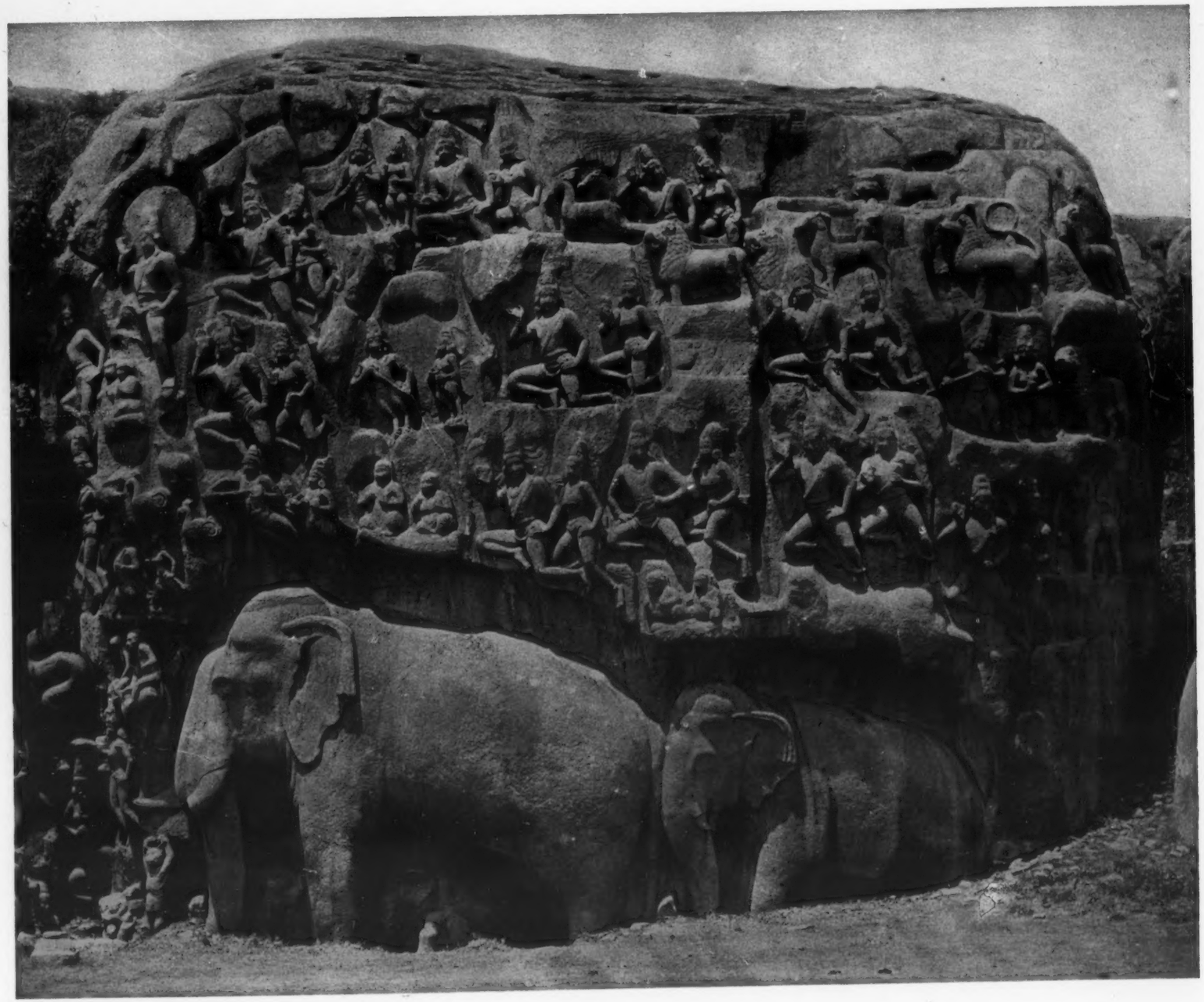
3.

4.

93.—Bas-Reliefs from Bharhut.



94.—Inner Face of Northern Gateway of Sánchi Tóp.



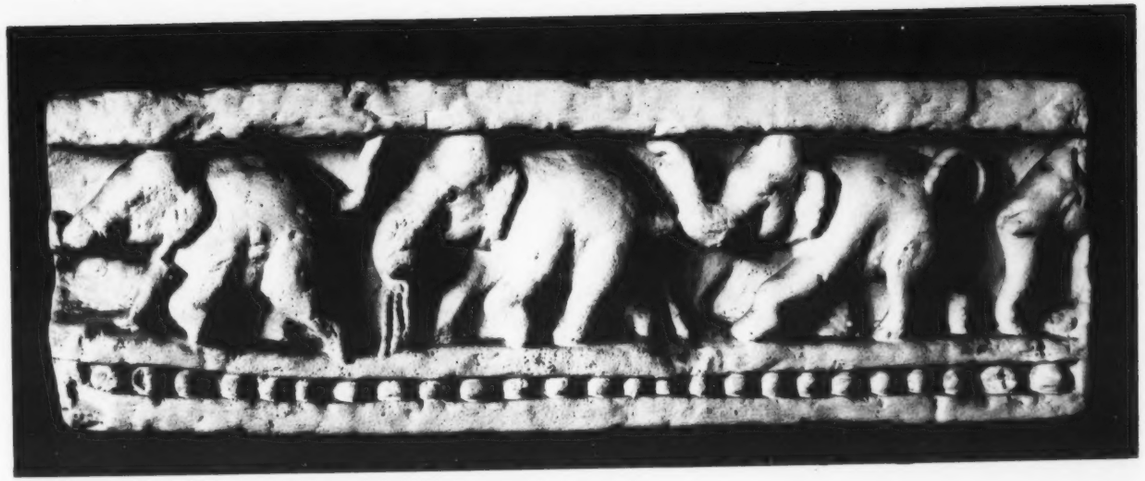
95.—Sculptured Rock, Máhávellipur.

96.—West Side of Navalákhá Temple, Ghumli, Kathiawar.

97.—Ganeca's Rath, from Seven Pagodahs, Mahabalipuram, Chingleput.

1.

2.



3.

98—Sculptures from Orissa.

99.—Back of Shrine, the Great Temple, Halebid, Mysore.

RED SANDSTONE BRACKET FOUND AT AGRA.

100.—MOULDED TERRA-COTTA CANTILEVER.

(India Museum, South Kensington.)

SCULPTURED WHITE MARBLE PANEL FROM RÁJPUTANA. SIXTEENTH CENTURY.

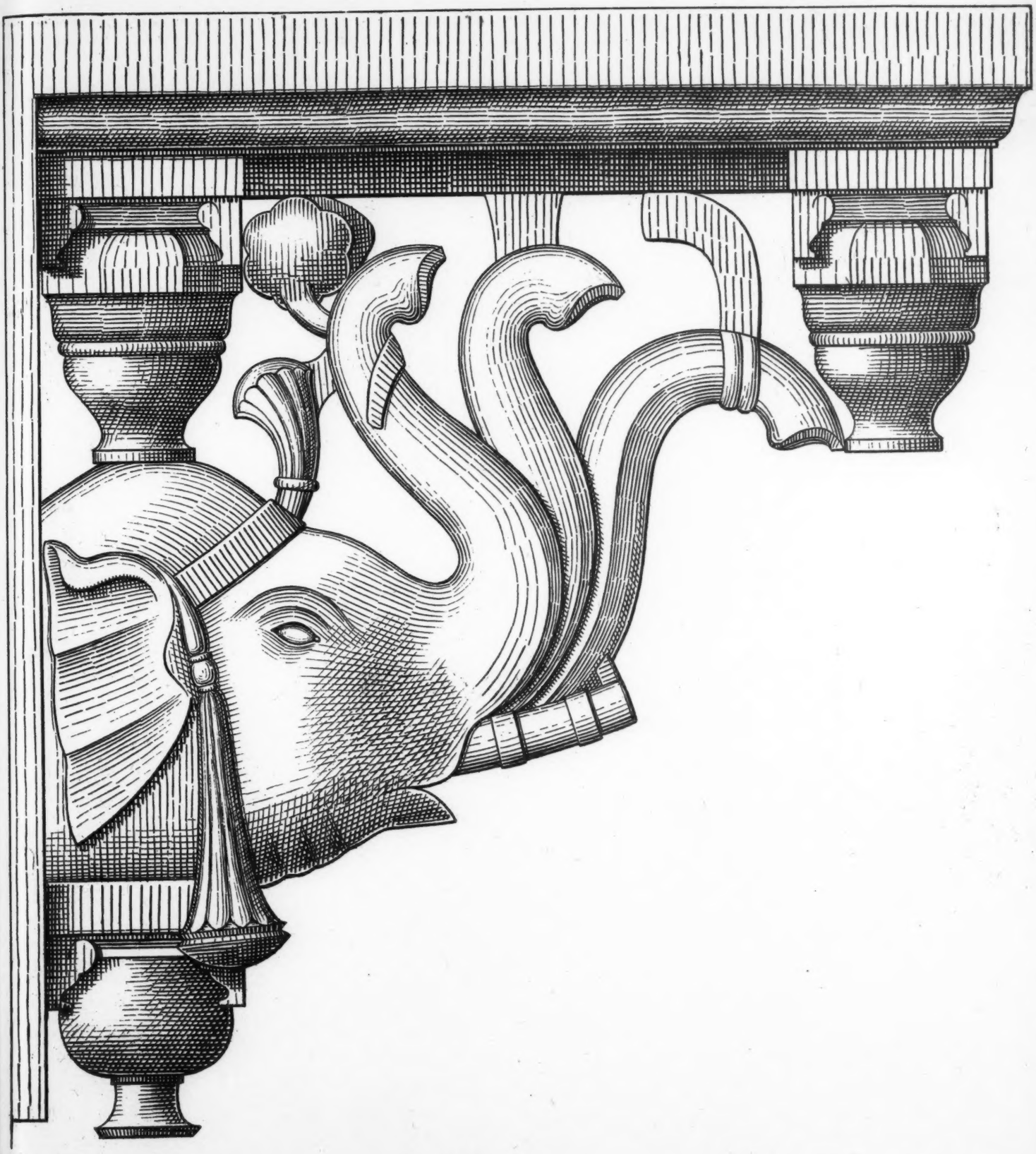
(India Museum.) *Scale about one-fifth.*

101.—BRONZE WORSHIPPING ELEPHANT. SIAMESE.

(British Museum.) *Full size.*

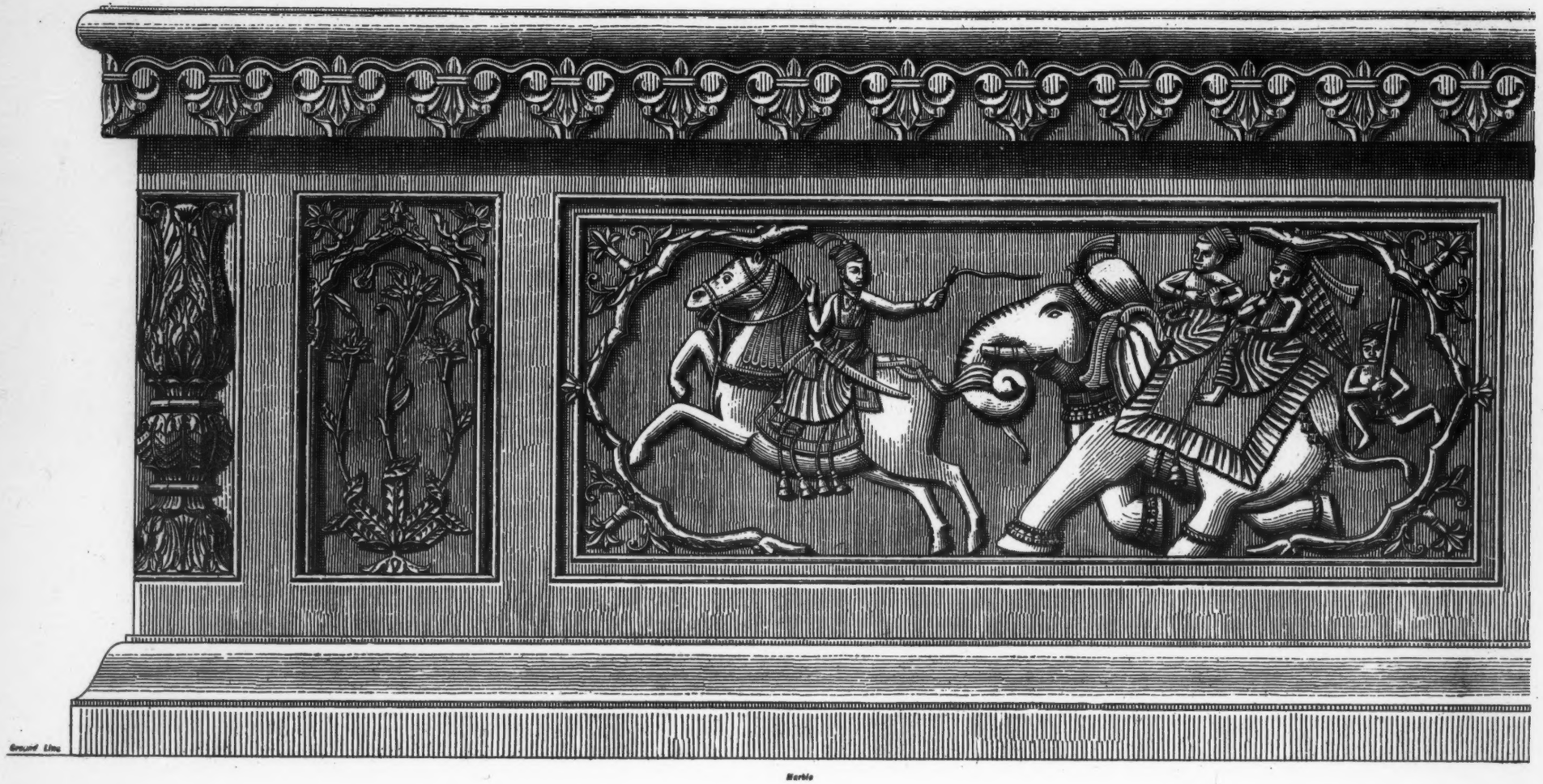
102.—Red Sandstone Spandril from the Gaja Pól in the Palace, Jáipur.

(*Scale 4½ inches to 1 foot.*)



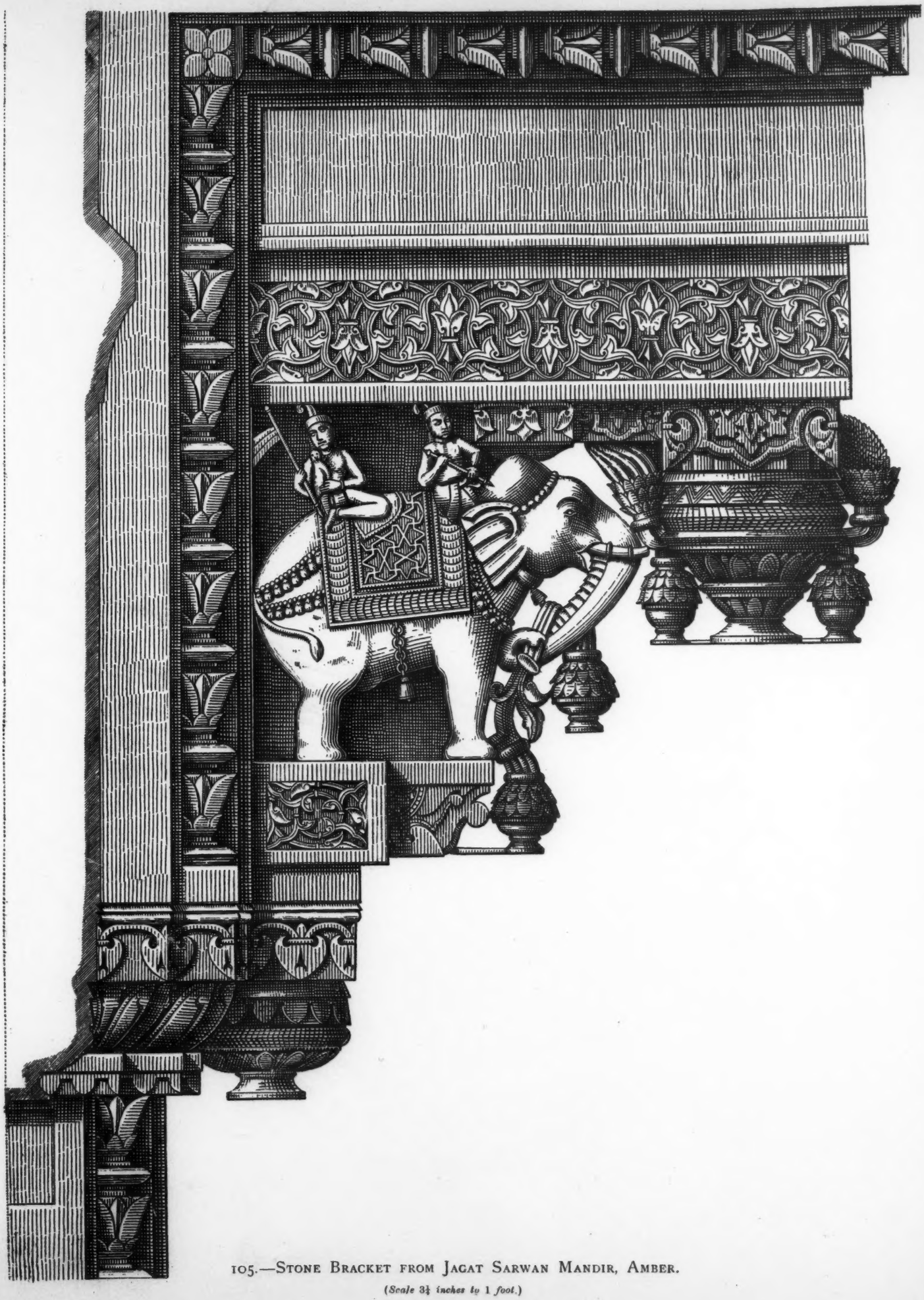
103.—Stone Bracket from Patodian Mandir, Jáipur.

(*Scale* 5½ *inches to* 1 *foot.*)



104.—Stone Plinth from Cenotaph of Maharajah Siwai Jai Singh, Jaipur.

(Scale 2¼ inches to 1 foot.)

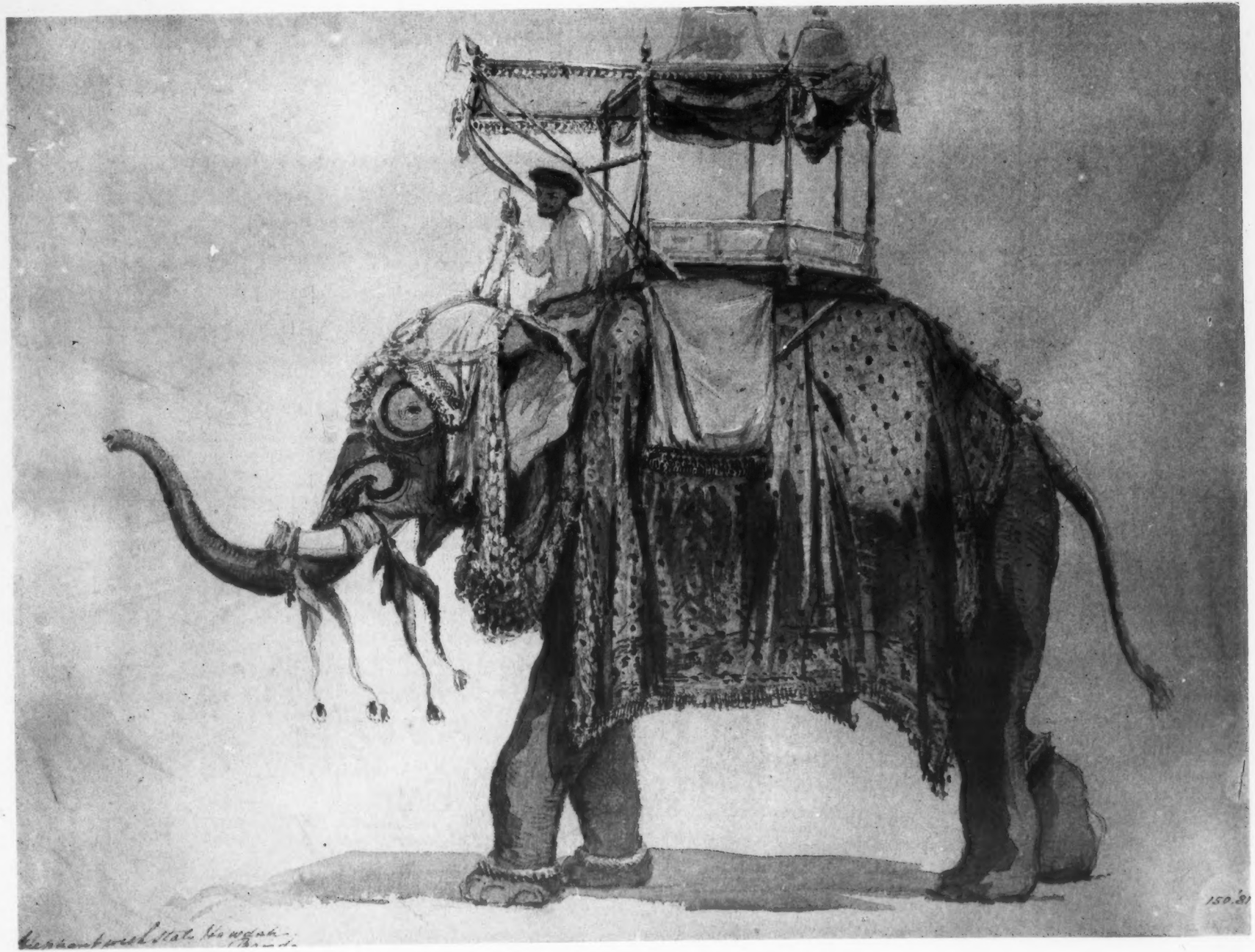


105.—Stone Bracket from Jagat Sarwan Mandir, Amber.

(Scale 3¾ inches to 1 foot.)

106.—Bronze Ganeça.
(British Museum.)

White Marble Ganeça (Modern).
(India Museum.)



107.—Elephant with Silver Howdah and Trappings of Cloth of Gold, his head painted as on State occasions.

(From a water-colour drawing in the India Museum, South Kensington.)

108.—Elephants as Executioners.

Reproduced from an illuminated page of the 'Ain-i-Akbari.

(Original in India Museum, South Kensington.)